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Merzeau et al.

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(54) **ARTICLE CARRIER AND BLANK THEREFOR**

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(57) **ABSTRACT**

An article carrier for packaging one or more articles and a blank for forming the carrier are disclosed. The carrier (**90**) comprises an engaging panel (**12**) having at least one article-engaging structure (RT**1**, RT**2**). The carrier (**90**) comprises a bundling structure having first and second segments. The first segment includes a first panel (**14**) hinged to the engaging panel (**12**) and abridging portion (**22**A, **26**A) hinged to the first panel (**14**). The second segment includes a second panel (**18**A) hinged to the engaging panel (**12**), a third panel (**18**B) hinged to the second panel (**18**A) in overlapping position therewith and a bridge-engaging feature engaging the bridging portion (**22**A, **26**A). The bridge-engaging feature is provided at least by the second and third
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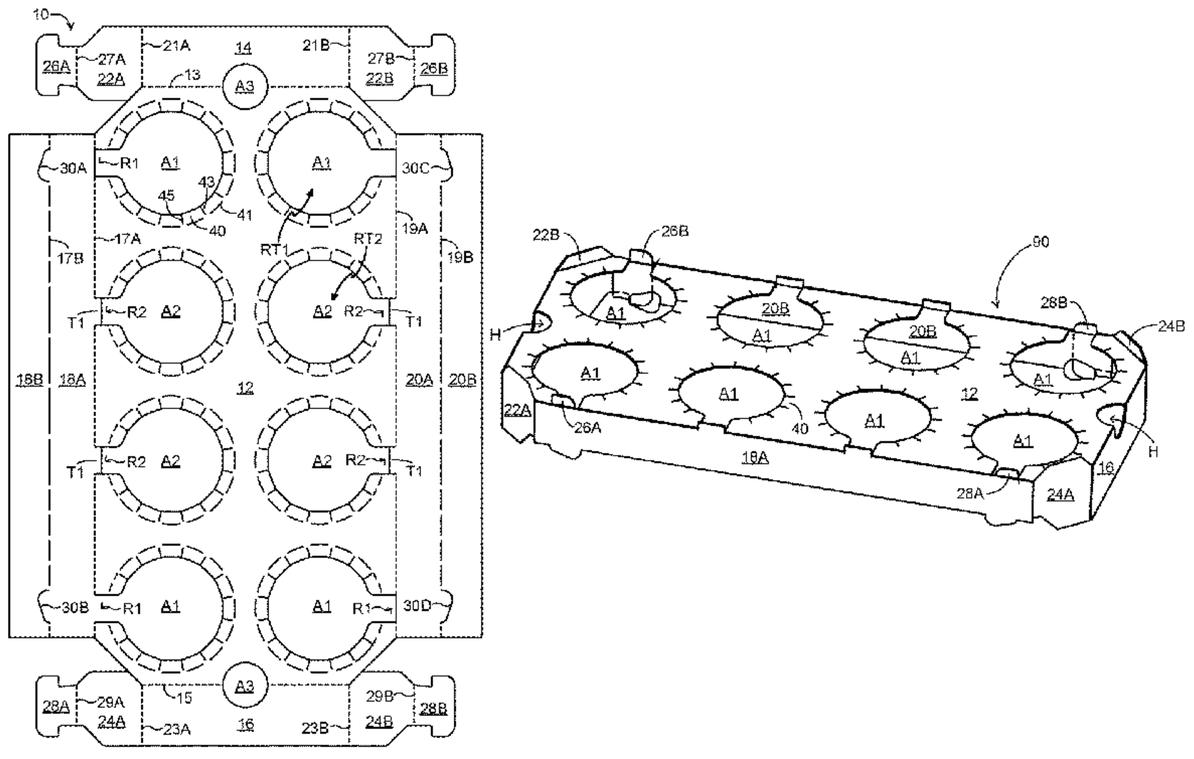

panels (**18**A, **18**B) such that art of the bridging portion (**22**A, **26**A) is disposed between the second and third panels (**18**A, **18**B).

20 Claims, 10 Drawing Sheets

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USPC 206/140
See application file for complete search history.

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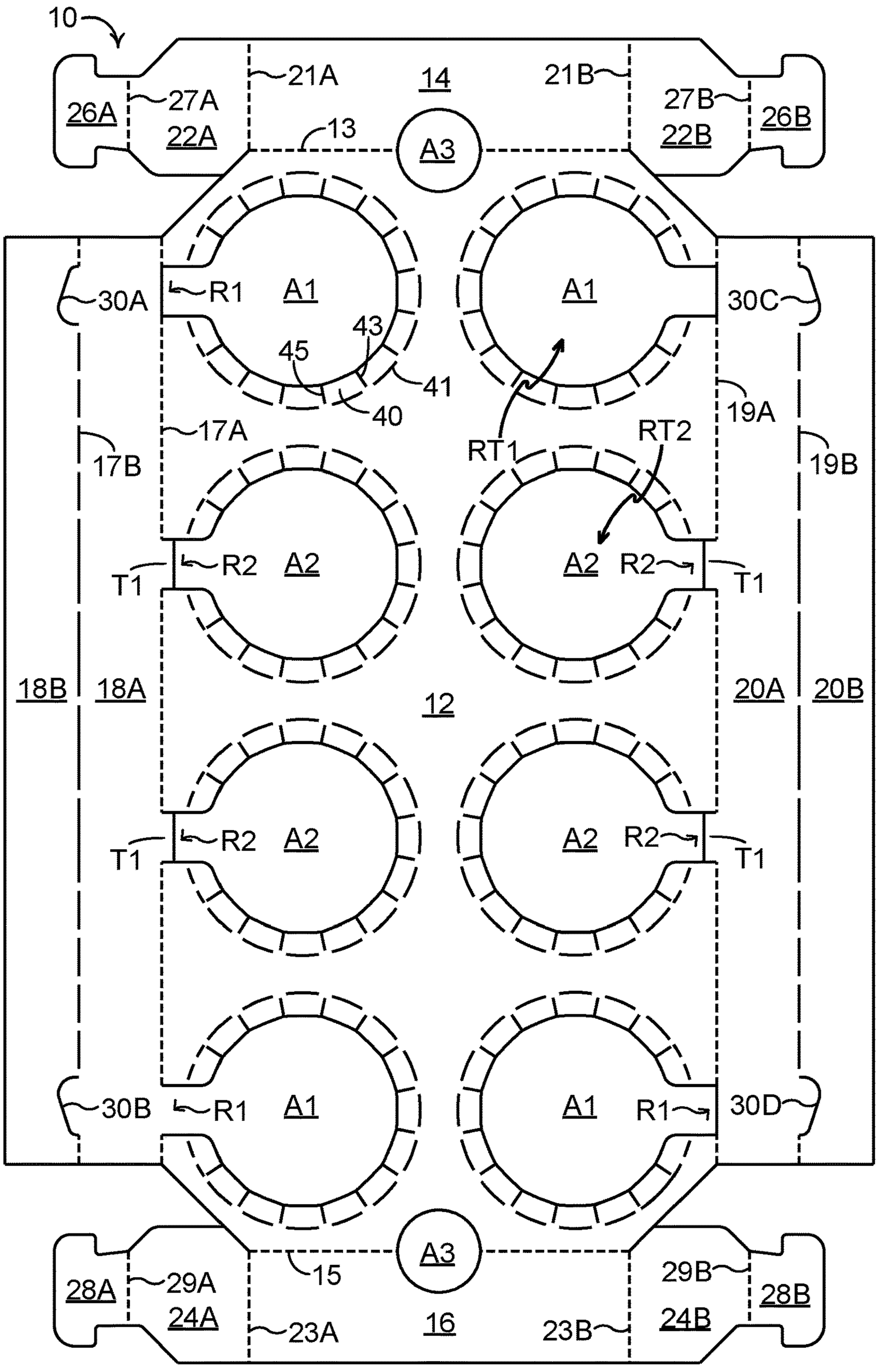

10
21A
14
21B
26A
27A
22A
13
A3
27B
22B
26B
30A
R1
A1
43
45
41
40
A1
30C
19A
17A
RT1
RT2
17B
19B
R2
A2
T1
A2
R2
T1
18B
18A
12
20A
20B
R2
A2
T1
A2
R2
T1
R1
A1
A1
R1
30B
30D
A3
15
28A
29A
24A
23A
16
23B
29B
24B
28B

FIG. 1

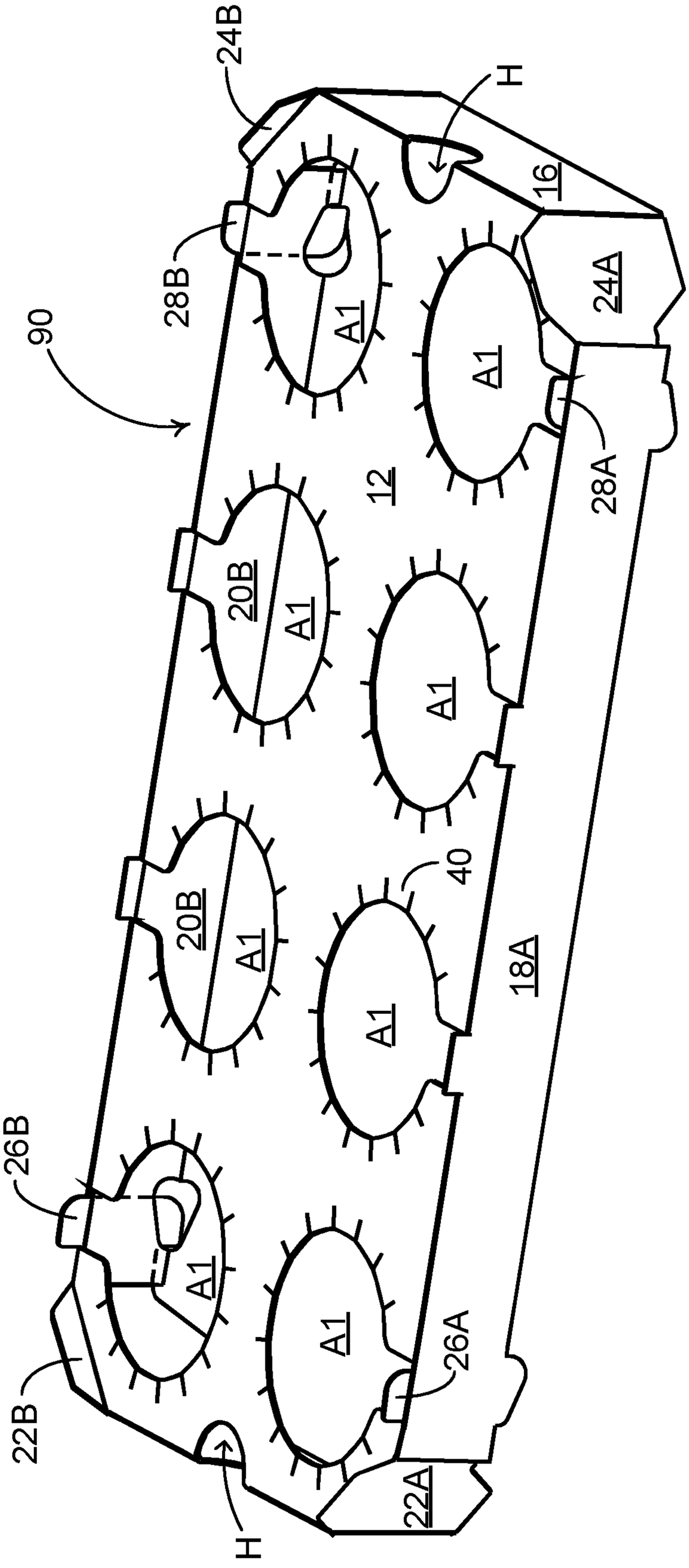

24B
H
16
28B
A1
90
24A
A1
12
28A
20B
A1
A1
20B
A1
40
18A
A1
26B
A1
A1
26A
22B
H
22A

FIG. 2

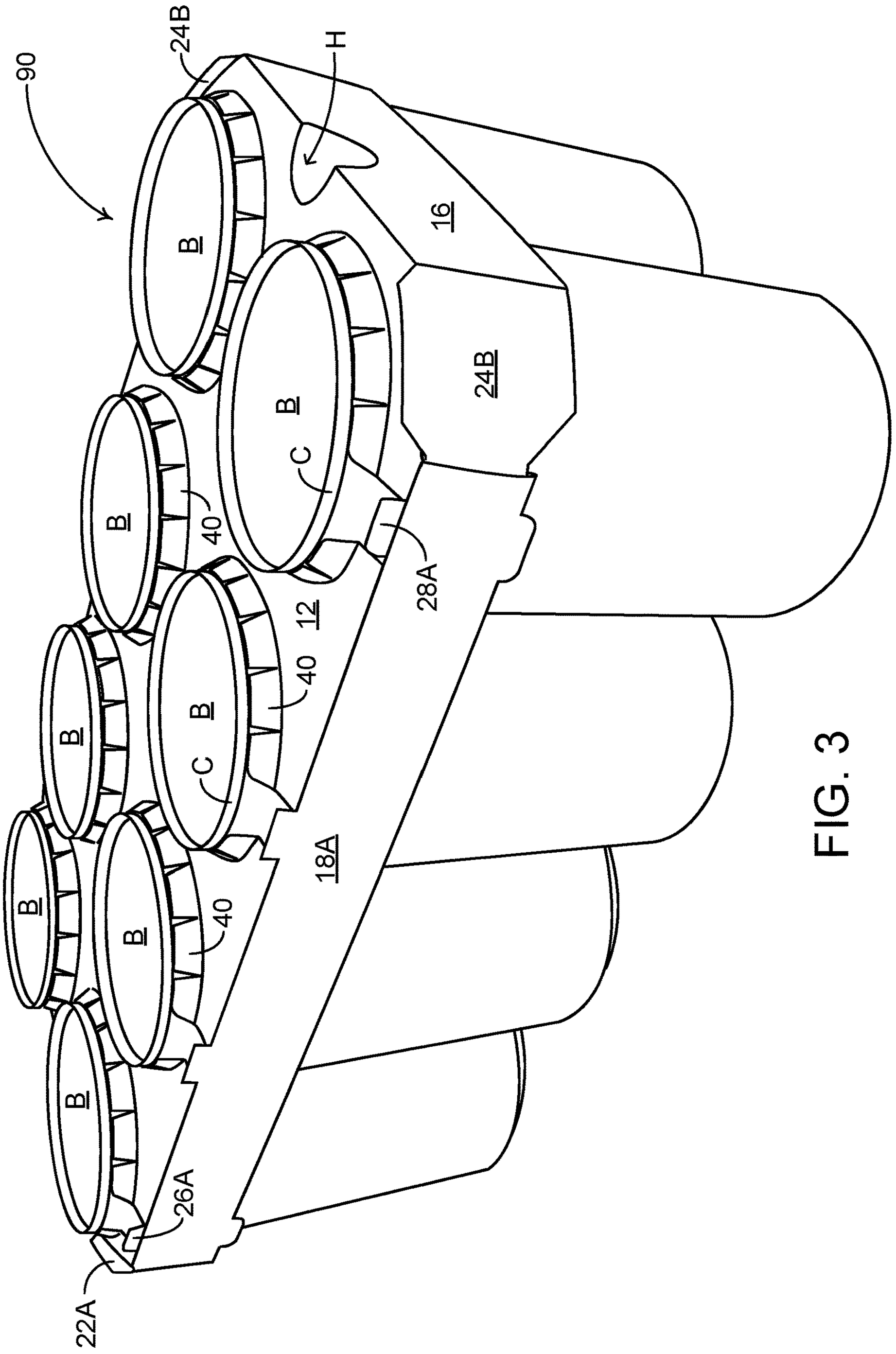


FIG. 3

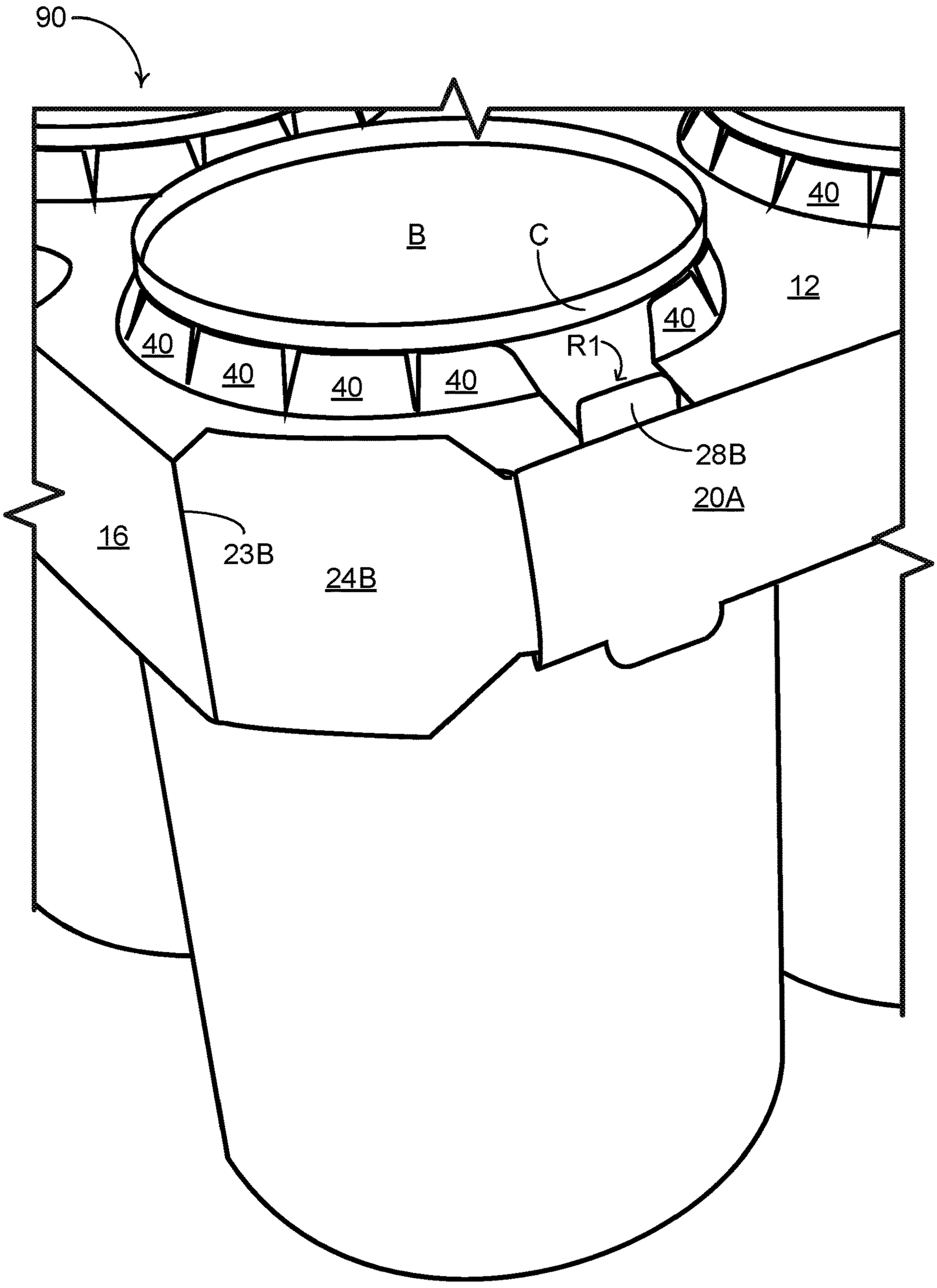
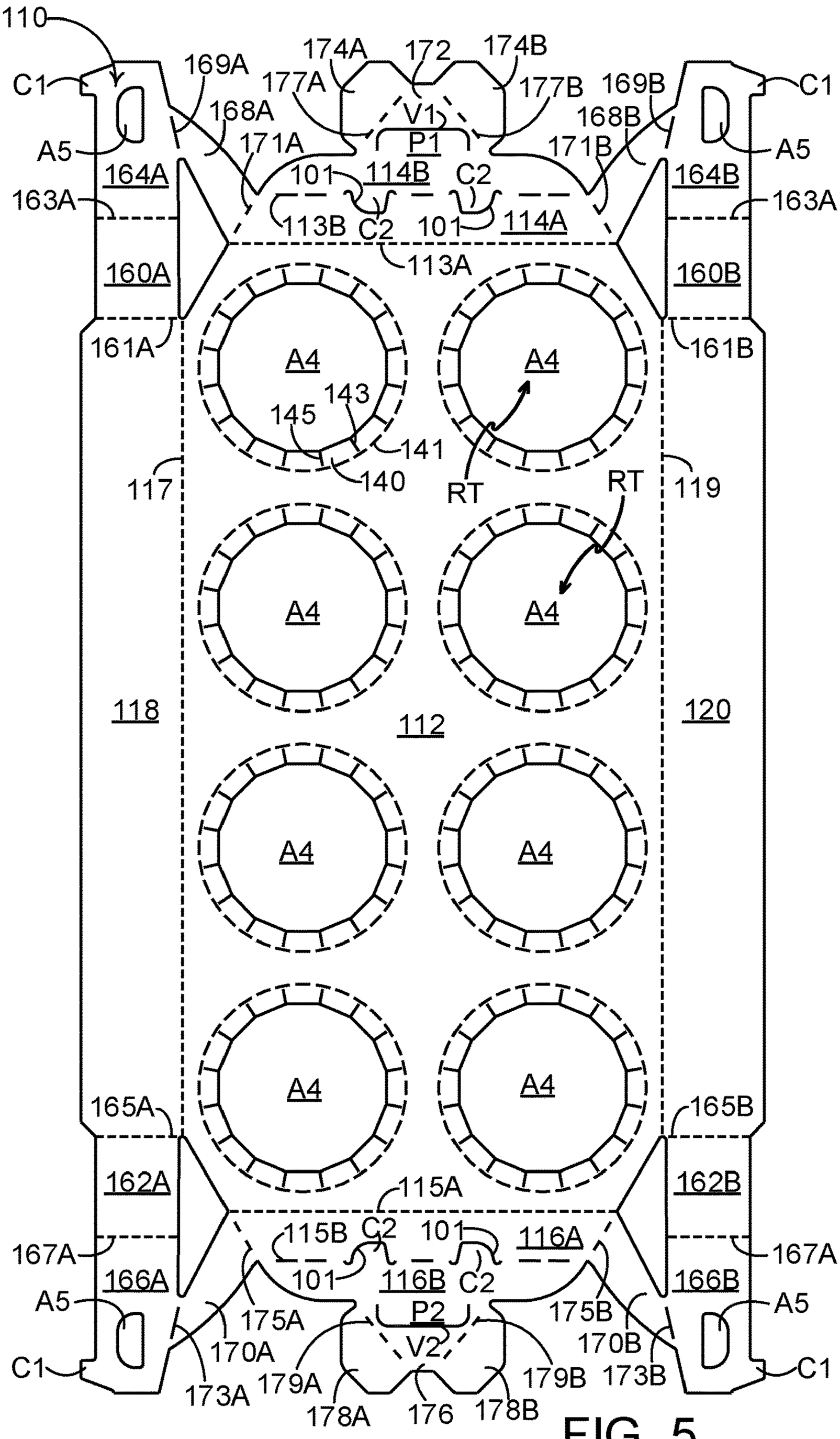


FIG. 4


110
C1
169A
174A
172
174B
177A
177B
169B
C1
168A
V1
168B
A5
171A
P1
171B
A5
164A
101
114B
C2
164B
163A
113B
C2
101
114A
163A
113A
160A
160B
161A
161B
A4
A4
143
145
141
140
117
RT
RT
119
A4
A4
118
112
120
A4
A4
A4
A4
165A
165B
162A
162B
115A
115B
C2
101
116A
167A
167A
101
116B
C2
166A
166B
A5
P2
175B
A5
175A
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V2
C1
C1
179A
179B
173B
173A
178A
176
178B

FIG. 5

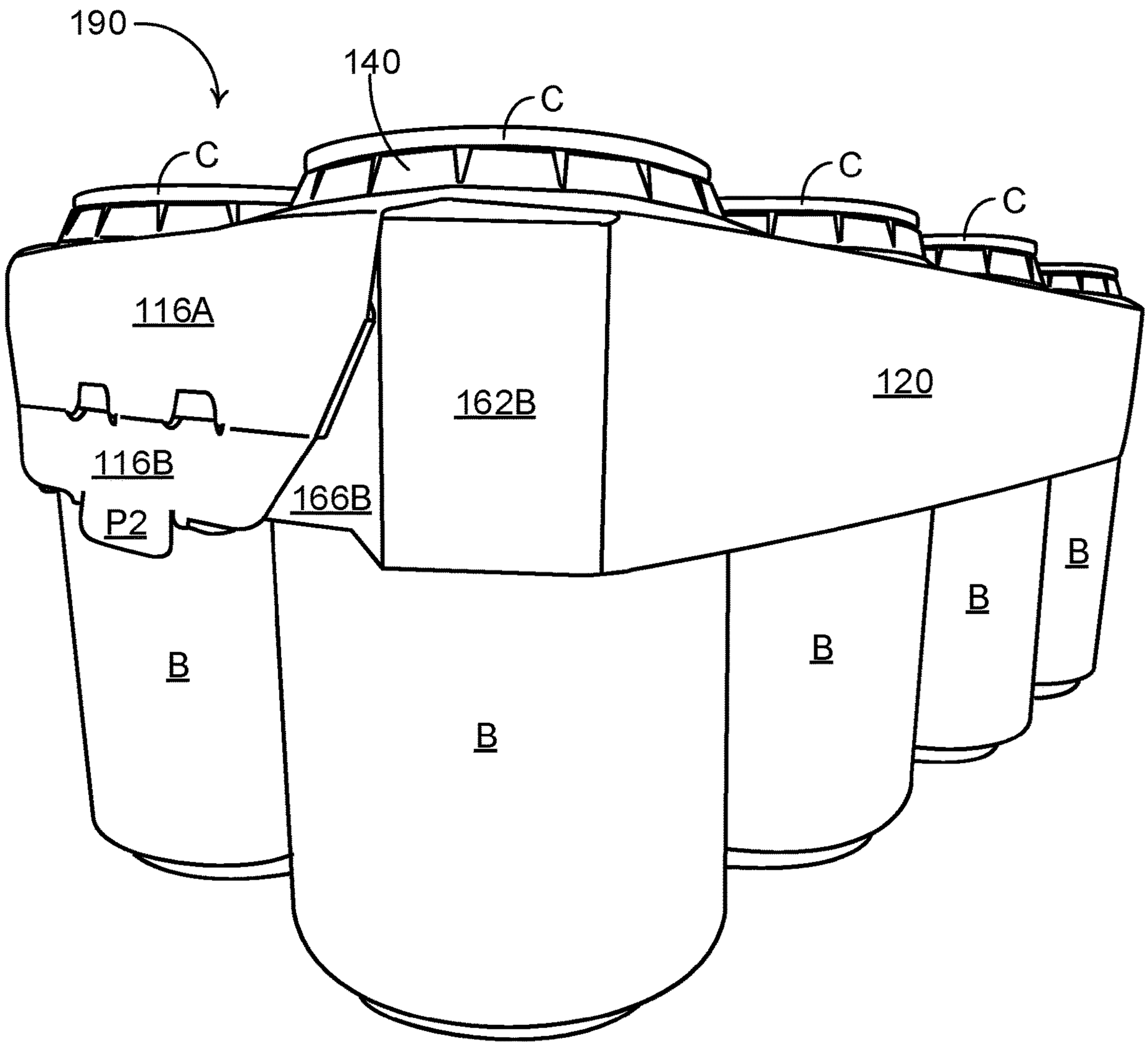

FIG. 6

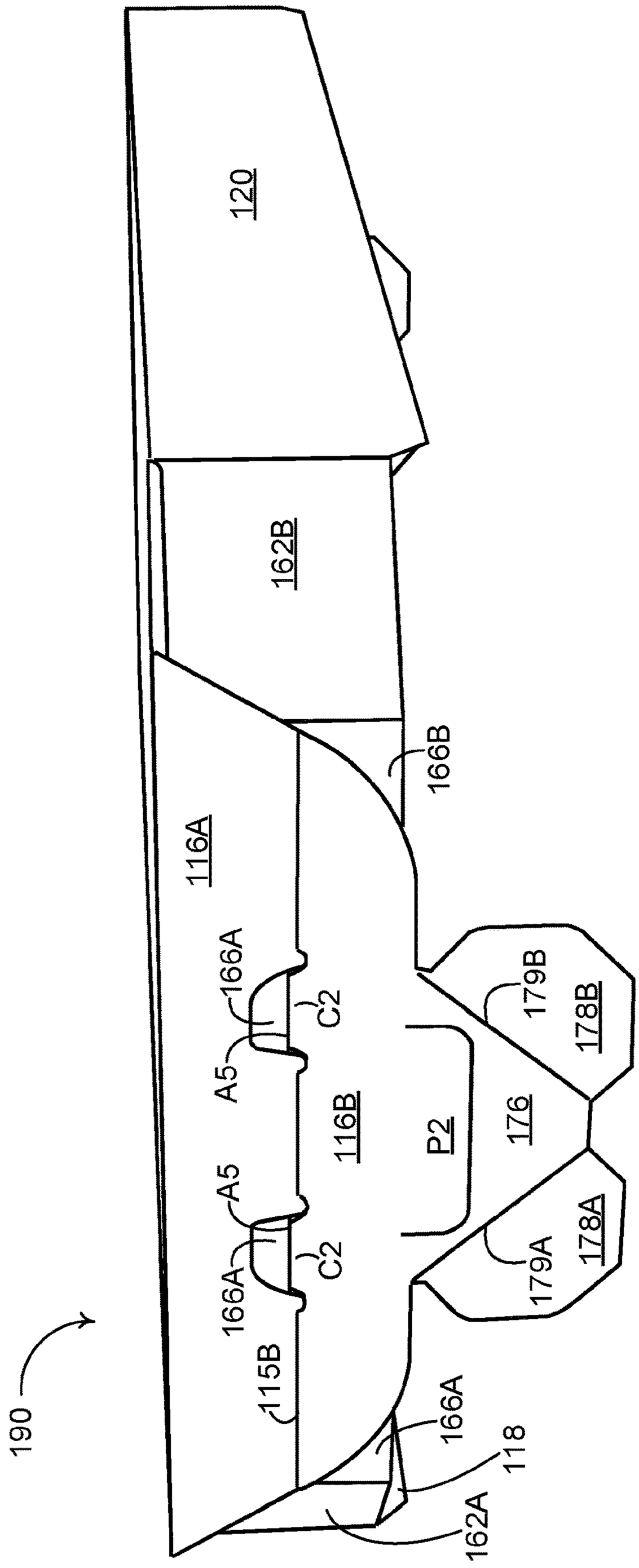
190
120
162B
166B
116A
166A
A5
C2
116B
P2
176
179B
178B
179A
178A
115B
166A
118
162A

FIG. 7

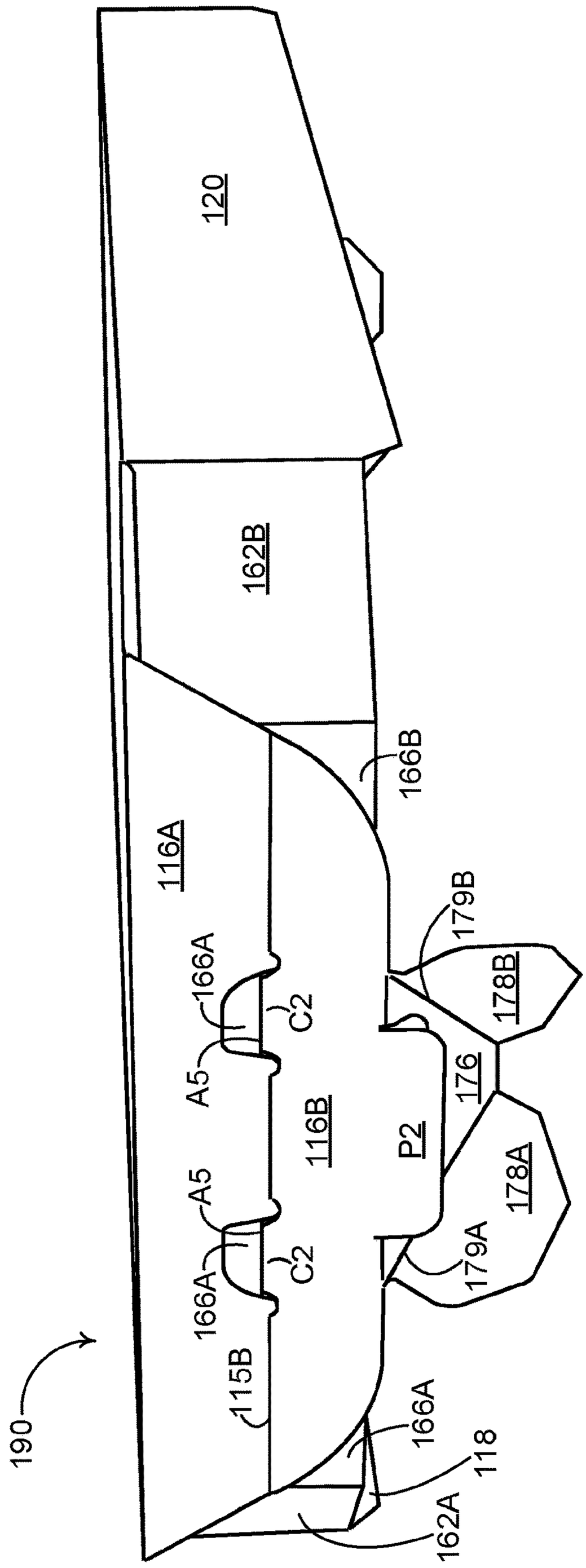
120
162B
166B
116A
179B
178B
176
166A
C2
A5
116B
P2
178A
179A
166A
C2
A5
115B
166A
118
162A
190

FIG. 8

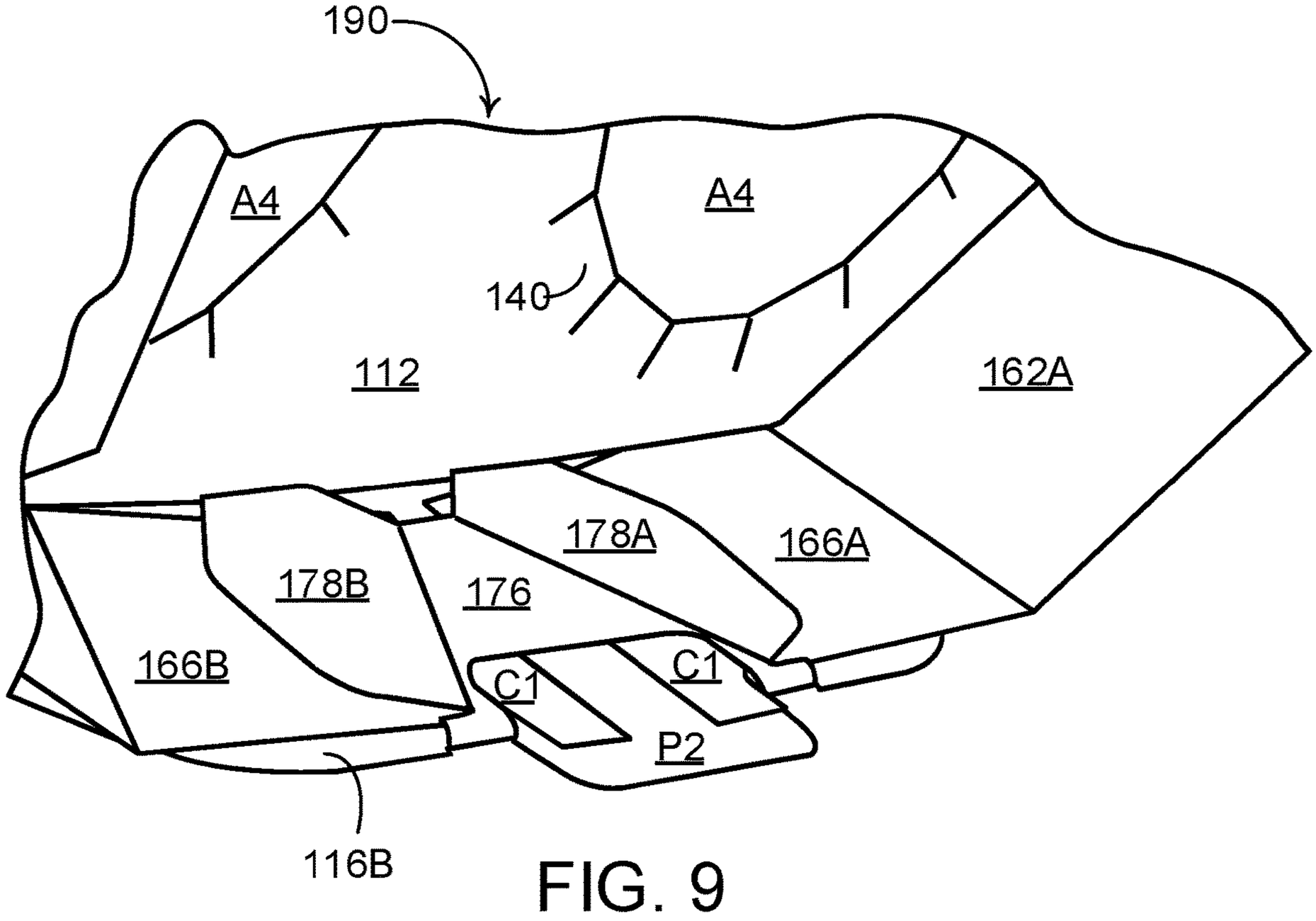

FIG. 9

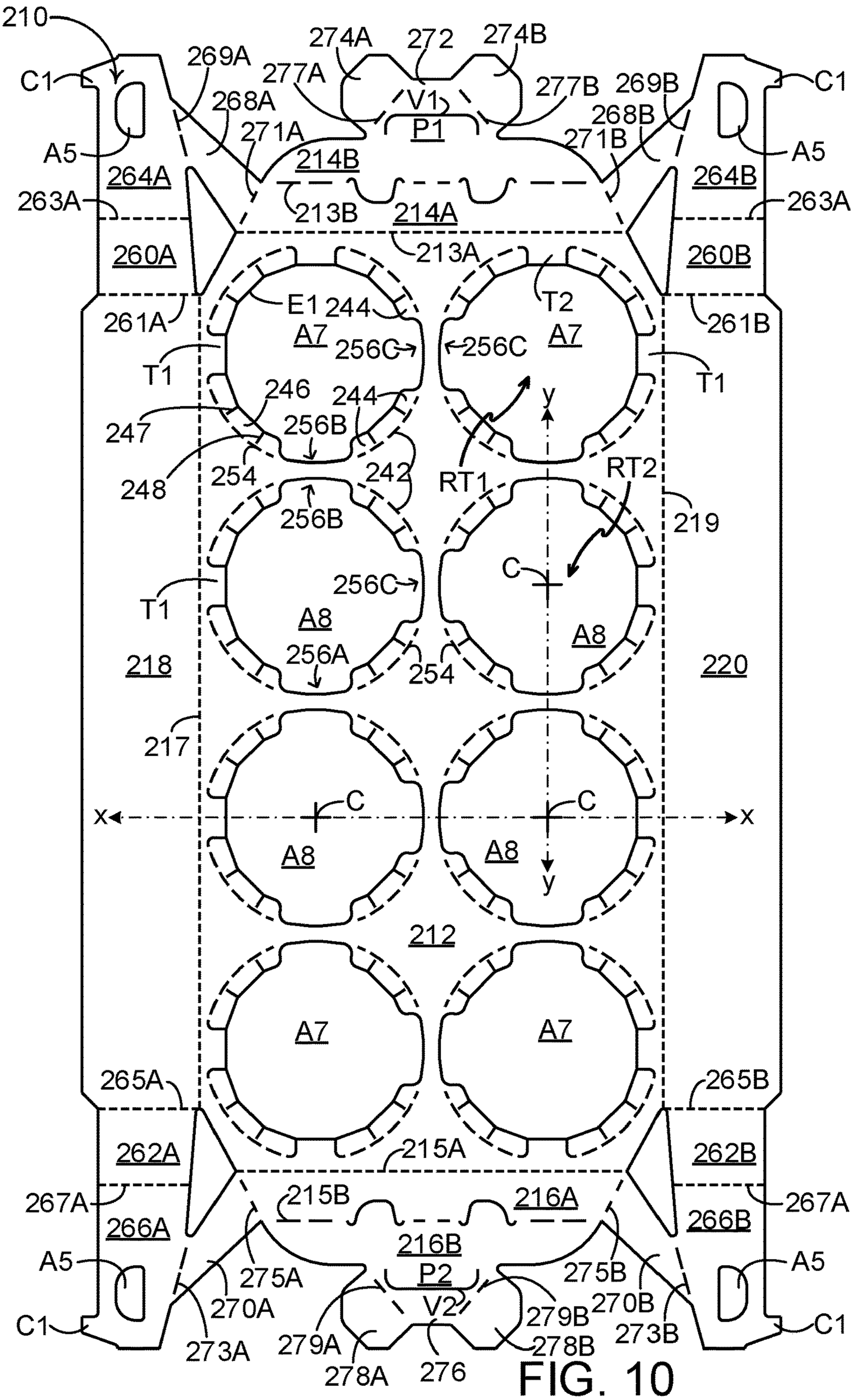
210
C1
269A
274A
272
274B
277A
277B
269B
C1
268A
V1
P1
268B
271A
271B
A5
214B
A5
264A
264B
263A
213B
214A
263A
260A
213A
260B
E1 244
T2
261A
261B
A7
256C
256C
A7
T1
T1
246
244
247
256B
254
242
248
RT1
RT2
219
256B
C
256C
T1
A8
A8
218
256A
254
220
217
C
C
x
x
A8
A8
y
212
A7
A7
265A
265B
262A
215A
262B
267A
215B
216A
267A
266A
266B
216B
A5
P2
275A
275B
A5
270A
V2
279B
270B
C1
273A
279A
273B
C1
278B
278A
276

FIG. 10

ARTICLE CARRIER AND BLANK THEREFOR

TECHNICAL FIELD

The present invention relates to article carriers and to blanks for forming the same. More specifically, but not exclusively, the invention relates to a carrier of the top-gripping type having one or more apertures for receiving and retaining an article therein.

BACKGROUND

In the field of packaging it is known to provide cartons for carrying multiple articles. Cartons are well known in the art and are useful for enabling consumers to transport, store and access a group of articles for consumption. For cost and environmental considerations, such cartons or carriers need to be formed from as little material as possible and cause as little wastage in the materials from which they are formed as possible. Further considerations are the strength of the carton and its suitability for holding and transporting large weights of articles. It is desirable that the contents of the carton are secure within the carton.

It is well known to provide top gripping article carriers in which an aperture is formed in a panel of the carrier, wherein tabs are struck from said aperture. The tabs are displaced out of the plane of said panel when an article is received in the aperture, wherein said tabs engage the article generally about a flange or lip of the article.

The present invention seeks to provide an improvement in the field of cartons, typically formed from paperboard or the like.

SUMMARY

A first aspect of the invention provides an article carrier for engaging at least one article. The article carrier comprises an engaging panel which has at least one article-engaging structure for engaging a part of the at least one article. The article carrier comprises a bundling structure for encircling the at least one article. The bundling structure comprises a first segment and a second segment. The first segment includes a first panel hingedly connected to the engaging panel and a bridging portion hingedly connected to the first panel. The second segment includes a second panel hingedly connected to the engaging panel and a third panel hingedly connected to the second panel and disposed in an overlapping position with the second panel. The second segment also includes a bridge-engaging feature in engagement with the bridging portion of the first segment. The bridge-engaging feature is provided at least by the second and third panels such that at least part of the bridging portion is disposed between the second and third panels in face-contacting arrangement with the second and third panels.

Optionally, the bridge-engaging feature comprises a first cutaway defined in at least one of the second and third panels, the first cutaway providing a first receiver for a first portion of the bridging portion.

Optionally, the bridge-engaging feature comprises a second cutaway in at least one of the engaging panel and the second panel, the second cutaway providing a second receiver for a second portion of the bridging portion.

Optionally, the second cutaway extends from one of said at least one article-engaging structures.

Optionally, the bridging portion comprises at least one detent, optionally, a pair of detents.

Optionally, the article carrier is preformed prior to application to a group of articles.

Optionally, the bridge-engaging feature comprises at least one locking element provided by the second panel and at least one locking opening defined in the bridging portion and receiving the locking element.

Optionally, the bridge-engaging feature may further comprise a second cutaway in one of the bridging portion and second panel, the second cutaway providing a second receiver for a tab provided by the other one of the bridging portion and second panel.

A second aspect of the invention provides an article carrier for engaging at least one article. The article carrier comprises an engaging panel which has at least one article-engaging structure for engaging a part of the at least one article and a bundling structure for encircling the at least one article. The bundling structure comprises a first segment, a second segment, and a bridge-engaging feature. The first segment includes a first panel hingedly connected to the engaging panel and a bridging portion hingedly connected to the first panel. The second segment includes a second panel hingedly connected to the engaging panel. The bridge-engaging feature is provided by at least part of the at least one article-engaging structure. The bridge-engaging feature is engaged with the bridging portion of the first segment such that the first panel and second panel are interconnected continuously by the bridging portion extending between the first and second segments.

Optionally, the article carrier comprises a handle opening defined, at least in part, in one of the panels forming the first or second segment.

Optionally, the handle opening is defined in part in the engaging panel.

Optionally, the article carrier comprises a handle opening defined, at least in part, in the engaging panel.

A third aspect of the invention provides a blank for forming an article carrier. The blank comprises an engaging panel which has at least one article-engaging structure for engaging a part of the at least one article. The blank comprises a bundling structure for encircling the at least one article. The bundling structure comprises a first segment and a second segment. The first segment includes a first panel hingedly connected to the engaging panel and a bridging portion hingedly connected to the first panel. The second segment includes a second panel hingedly connected to the engaging panel and a third panel hingedly connected to the second panel and disposed in an overlapping position with the second panel. The second segment also includes a bridge-engaging feature for engagement with the bridging portion of the first segment. The bridge-engaging feature is provided at least by the second and third panels and arranged such that in a setup carrier at least part of the bridging portion is disposed between the second and third panels in face-contacting arrangement with the second and third panels.

A fourth aspect of the invention provides a blank for forming an article carrier. The blank comprises an engaging panel which has at least one article-engaging structure for engaging a part of the at least one article and a bundling structure for encircling the at least one article. The bundling structure comprises a first segment, a second segment, and a bridge-engaging feature. The first segment includes a first panel hingedly connected to the engaging panel and a bridging portion hingedly connected to the first panel. The second segment includes a second panel hingedly connected to the engaging panel. The bridge-engaging feature is provided by at least part of the at least one article-engaging

structure. The bridge-engaging feature isengageable with the bridging portion of the first segment in a setup carrier such that the first panel and second panel are interconnected continuously by the bridging portion extending between the first and second segments.

Within the scope of this application it is envisaged or intended that the various aspects, embodiments, examples, features and alternatives set out in the preceding paragraphs, in the claims and/or in the following description and drawings may be considered or taken independently or in any combination thereof.

Features or elements described in connection with, or relation to, one embodiment are applicable to all embodiments unless there is an incompatibility of features. One or more features or elements from one embodiment may be incorporated into, or combined with, any of the other embodiments disclosed herein, said features or elements extracted from said one embodiment may be included in addition to, or in replacement of one or more features or elements of said other embodiment.

A feature, or combination of features, of an embodiment disclosed herein may be extracted in isolation from other features of that embodiment. Alternatively, a feature, or combination of features, of an embodiment may be omitted from that embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the invention will now be described with reference to the accompanying drawings, in which:

FIG. **1** is a plan view from above of a blank for forming a carrier according to a first embodiment;

FIG. **2** is a perspective view from above of a carrier formed from the blank of FIG. **1**;

FIG. **3** is a plan view from above of a blank for forming a carrier according to a second embodiment; and

FIG. **4** is a perspective view from above of a carrier formed from the blank of FIG. **3**;

FIG. **5** is a plan view from above of a blank for forming a carrier according to a second embodiment;

FIG. **6** is a perspective view from above of a carrier formed from the blank of FIG. **5**;

FIGS. **7** and **8** illustrate stages of construction of the carrier of FIG. **5**;

FIG. **9** is an internal view of a portion of the carrier of FIG. **6**;

FIG. **10** is a plan view from above of a blank for forming a carrier according to a third embodiment.

DETAILED DESCRIPTION OF EMBODIMENTS

Detailed descriptions of specific embodiments of the package, blanks and carriers are disclosed herein. It will be understood that the disclosed embodiments are merely examples of the way in which certain aspects of the invention can be implemented and do not represent an exhaustive list of all of the ways the invention may be embodied. As used herein, the word "exemplary" is used expansively to refer to embodiments that serve as illustrations, specimens, models, or patterns. Indeed, it will be understood that the packages, blanks and carriers described herein may be embodied in various and alternative forms. The Figures are not necessarily to scale and some features may be exaggerated or minimized to show details of particular components. Well-known components, materials or methods are not necessarily described in great detail in order to avoid obscuring the present disclosure. Any specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the invention.

Referring to FIG. **1**, there is shown a plan view of a blank **10** which is capable of forming a carton or carrier **90**, as shown in FIG. **2**, for containing and carrying a group of primary products such as, but not limited to, bottles or cans, hereinafter referred to as articles B, as shown in FIG. **3**. The blank **10** forms a secondary package for packaging at least one primary product container or package.

Alternative blanks **110**; **210** are shown in FIGS. **5** and **10** for forming carton or carrier **190**, as shown in FIG. **6**, for containing and carrying a group of primary products such as, but not limited to, bottles or cans, hereinafter referred to as articles B.

In the embodiments detailed herein, the terms "carton" and "carrier" refer, for the non-limiting purpose of illustrating the various features of the invention, to a container for engaging and carrying articles, such as primary product containers. It is contemplated that the teachings of the invention can be applied to various product containers, which may or may not be tapered and/or cylindrical. Exemplary containers include bottles (for example metallic, glass or plastics bottles), cans (for example aluminum cans), tins, pouches, packets and the like.

The blank **10**; **110**; **210** is formed from a sheet of suitable substrate. It is to be understood that, as used herein, the term "suitable substrate" includes all manner of foldable sheet material such as paperboard, corrugated board, cardboard, plastic, combinations thereof, and the like. It should be recognized that one or other numbers of blanks may be employed, where suitable, for example, to provide the carrier structure described in more detail below.

The packaging structures or cartons **90**; **190** described herein may be formed from a sheet material such as paperboard, which may be made of or coated with materials to increase its strength. An example of such a sheet material is tear-resistant NATRALOCK® paperboard made by WestRock Company. It should be noted that the tear resistant materials may be provided by more than one layer, to help improve the tear-resistance of the package. Typically, one surface of the sheet material may have different characteristics to the other surface. For example, the surface of the sheet material that faces outwardly from a finished package may be particularly smooth and may have a coating such as a clay coating or other surface treatment to provide good printability. The surface of the sheet material that faces inwardly may, on the other hand, be provided with a coating, a layer, a treatment or be otherwise prepared to provide properties such as one or more of tear-resistance, good glue-ability, heat sealability, or other desired functional properties.

In the illustrated embodiments, the blanks **10**; **110**; **210** are configured to form a carton or carrier **90** for packaging an exemplary arrangement of exemplary articles B. In the embodiment illustrated in FIGS. **1** to **9**, the arrangement is a 2×4 matrix or array; in the illustrated embodiments two rows of four articles B are provided, and the articles B are 330 ml beverage cans. In the embodiment illustrated in FIG. **10**, the arrangement is a 2×4 matrix or array; in the illustrated embodiments two rows of four articles B are provided, and the articles B are 330 ml beverage cans of a sleek or slim design.

Alternatively, the blanks **10**; **110**; **210** can be configured to form a carrier for packaging other types, number and size

of articles and/or for packaging articles in a different arrangement or configuration.

Referring to FIG. **1** there is shown a blank **10** comprising a plurality of panels **12**, **14**, **16**, **18**A, **18**A, **20**A, **20**B, including a main panel **12** for forming a top wall or engaging panel of a carrier **90** (see FIG. **2**).

A first outer side panel **18**A is hingedly connected to a first side of the main panel **12** by a hinged connection in the form of a fold line **17**A. A first inner side panel **18**B is hingedly connected to the first outer side panel **18**A by a hinged connection in the form of a fold line **17**B.

A second outer side panel **20**A is hingedly connected to a second side of the main panel **12** by a hinged connection in the form of a fold line **19**A. A second inner side panel **20**B is hingedly connected to the second outer side panel **20**A by a hinged connection in the form of a fold line **19**B.

The blank **10** comprises a first end strap **26**A/**22**A/**14**/**22**B/**26**B. The first end strap **26**A/**22**A/**14**/**22**B/**26**B comprises a first end panel **14**. The first end panel **14** is hingedly connected to a first end of the main panel **12** by a hinged connection in the form of a fold line **13**. A first corner panel **22**A is hingedly connected to a first end of the first end panel **14** by a hinged connection in the form of a fold line **21**A. A first securing panel **26**A is hingedly connected to an end of the first corner panel **22**A by a hinged connection in the form of a fold line **27**A.

A second corner panel **22**B is hingedly connected to a second end of the first end panel **14** by a hinged connection in the form of a fold line **21**B. A second securing panel **26**B is hingedly connected to an end of the second corner panel **22**B by a hinged connection in the form of a fold line **27**B.

The first end strap **26**A/**22**A/**14**/**22**B/**26**B forms a first end wall of the carrier **90**.

The blank comprises a second end strap **28**A/**24**A/**16**/**24**B/**28**B. The second end strap **28**A/**24**A/**16**/**24**B/**28**B comprises a second end panel **16**. The second end panel **16** is hingedly connected to a second end of the main panel **12** by a hinged connection in the form of a fold line **15**. A third corner panel **24**A is hingedly connected to a first end of the second end panel **16** by a hinged connection in the form of a fold line **23**A. A third securing panel **28**A is hingedly connected to an end of the third corner panel **24**A by a hinged connection in the form of a fold line **29**A.

A fourth corner panel **24**B is hingedly connected to a second end of the second end panel **16** by a hinged connection in the form of a fold line **23**B. A fourth securing panel **28**B is hingedly connected to an end of the fourth corner panel **24**B by a hinged connection in the form of a fold line **29**B.

The second end strap **28**A/**24**A/**16**/**24**B/**28**B forms a second end wall of the carrier **90**.

The first end strap **26**A/**22**A/**14**/**22**B/**26**B, second end strap **28**A/**24**A/**16**/**24**B/**28**B inner and outer side panels **18**B, **20**B, **18**A, **20**A form part of a bundling structure for surrounding the articles B being packaged.

The main panel **12** of the blank **10** includes at least one article retention structure RT**1**, RT**2**. The main panel **12** comprises a plurality of article retention structures RT**1**, RT**2**, specifically eight article retention structures RT**1**, RT**2** arranged in 2×4 matrix or array. Each of the article retention structures RT**1**, RT**2** comprises an opening or aperture A**1**, A**2**.

The article retention structures RT**1**, RT**2** of the illustrated embodiment take the form of a plurality of teeth or tabs **40** arranged in an annular series about an aperture A**1**, A**2** to form part of an article receiving opening. In other embodiments the article retention structures RT**1**, RT**2** may take a different form, for example but not limited to a pair of spaced apart opposing cuts which define a displaceable region forming a cover over an article and providing a pair of opposed engaging edges for engaging opposing sides of an article below a flange, chime or other projection.

The blank **10** comprises four endmost article retention structures RT**1** each comprising a first opening or aperture A**1**. The blank **10** comprises four medial or intermediate article retention structures RT**2** each comprising a second opening or aperture A**2**.

The endmost article retention structures RT**1** comprises an article receiving opening defined in part by the first aperture A**1** which is defined in, or struck from, the main panel **12**.

The intermediate article retention structures RT**2** comprises an article receiving opening defined in part by the second aperture A**2** which is defined in, or struck from, the main panel **12**.

The endmost article retention structures RT**1** and the intermediate article retention structures RT**2** each comprise a plurality of teeth or tabs **40** disposed about the first or second aperture A**1**, A**2** respectively.

The plurality of teeth **40** are provided by the main panel **12**. Each of the teeth **40** is hingedly connected to the main panel **12**, by a hinged connection. The hinged connection may be defined by a plurality of cut lines **41**. The plurality of cut lines **41** may be arranged as an annular series of cuts about the first or second apertures A**1**, A**2**.

The plurality of cut lines **41** may define or approximate a portion of circle.

Each of the plurality of teeth **40** comprises an engaging edge opposing a hinged edge. The engaging edges are defined by a linear portion of a cut line defining the first or second aperture A**1**, A**2**. Each engaging edge may define a part of a polygon. The illustrated embodiment comprises fifteen teeth **40** together defining a substantial portion of a hexadecagon. Each tooth **40** comprises a pair of side edges, the side edges are defined by cut lines **43**, **45** extending radially outward from respective vertices of the hexadecagon, that is to say, from a respective vertex between a pair of adjacent linear portions of the cut line defining the portion of a hexadecagon. The cut lines **43**, **45** are divergently arranged with respect to each other and define an angle therebetween, the angle may be about 22.5°.

Each of the plurality of cut lines **41** may be linear in shape.

In alternative embodiments each of the plurality of cut lines **41** may be arcuate or curved. The cut lines **41** may comprise a radius of curvature which is equal to half the diameter of the article receiving openings. The cut lines **41** may comprise a radius of curvature which is greater than half the diameter of article receiving openings.

The plurality of teeth **40** is interrupted by at least one recess or cutaway R**1**, R**2**.

The plurality of teeth **40** of the endmost article retention structures RT**1** are interrupted by a first recess or cutaway R**1**. The first recess R**1** is provided at a location about the circumference of the first aperture A**1** disposed in closest proximity to one of the side edges, defined by the fold lines **17**A, **19**A, of the main panel **12**. The first recess R**1** extends from the first aperture A**1** to the first or second outer side panel **18**A, **20**A. The first recess R**1** may interrupt or intersect with the fold line **17**A, **19**A between the main panel **12** and the first or second outer side panel **18**A, **20**A.

The plurality of teeth **40** of the intermediate article retention structures RT**2** are interrupted by a second recess or cutaway R**2**. The second recess R**2** is provided at a location about the circumference of the second aperture A**2**

disposed in closest proximity to one of the side edges, defined by the fold lines **17**A, **19**A, of the main panel **12**. The second recess R**2** extends from the first aperture A**1** towards the first or second outer side panel **18**A, **20**A. The second recess R**2** may terminate within the main panel **12** and define a spaced apart relationship with the fold line **17**A, **19**A between the main panel **12** and the first or second outer side panel **18**A, **20**A. A tab T**1** may be provided by material which would otherwise form the main panel **12**. The tab T**1** is integral with the first or second outer side panel **18**A, **20**A, that is to say they have an uninterrupted connection thereto—no fold or other hinge defining device is provided between the tab T**1** and the first or second outer side panel **18**A, **20**A.

The second recesses R**2** are shorter in length in a transverse direction of the blank **10** than the first recesses, when in the unfolded blank **10**.

The main panel **12** may optionally comprise a handle structure H see FIG. **2**. The handle structure may comprise at least one handle opening A**3**. In the illustrated embodiment the blank **10** comprises two handle openings A**3**. A first one of the handle openings A**3** is struck in part from the main panel **12** and in part from the first end panel **14**. A second one of the handle openings A**3** is struck in part from the main panel **12** and in part from the second end panel **16**.

The securing panels **26**A, **26**B, **28**A, **28**B are arranged to interlock with the side panels **18**A/**18**B, **20**A/**20**B.

The securing panels **26**A, **26**B, **28**A, **28**B are substantially "T" or hammerhead shaped although in other embodiments other suitable shapes may be employed to provide a detent or catch. The securing panels **26**A, **26**B, **28**A, **28**B comprises a pair of shoulders defined by substantially "L" shaped edge portions. The shoulders provide a catch or detent preventing or inhibiting separation of the securing panels **26**A, **26**B, **28**A, **28**B from a receiver provided in part by the side panels **18**A, **18**B, **20**A, **20**B and the first recesses R**1** in the main panel **12**.

The first outer and first inner side panels **18**A, **18**B comprise a pair of cutaways, in the illustrated embodiment the cutaways take the form of a cut line **30**A, **30**B. The cut lines **30**A, **30**B are nonlinear and interrupt the fold line **17**B hinging the first outer side panel **18**A to the first inner side panel **18**B. When the first inner panel **18**B is folded about fold line **17**B to be in face to face relationship with the first outer panel **18**A lower receiver openings are formed therebetween, proximate the hinged connection. The second outer and first inner side panels **20**A, **20**B comprise a pair of cutaways, in the illustrated embodiment the cutaways take the form of a cut line **30**C, **30**D. The cut lines **30**C, **30**D are nonlinear and interrupt the fold line **19**B hinging the second outer side panel **20**A to the second inner side panel **20**B. When the second inner panel **20**B is folded about fold line **19**B to be in face to face relationship with the second outer panel **20**A lower receiver openings are formed therebetween, proximate the hinged connection, best illustrated in FIG. **2**. The first recesses R**1** form upper receiver openings and together with the lower receiver openings provide a receiver for engaging with and locking the first and third securing panels **26**A, **28**A to the first outer and first inner side panels **18**A, **18**B and locking the second and fourth securing panels **26**B, **28**B to the second outer and second inner side panels **20**A, **20**B.

Turning to the construction of the carrier **90** from the blank **10**, the blank **10** may be formed into an assembled carrier **90**, as shown in FIG. **2**, prior to being applied to a group of articles B.

The blank **10** is folded about fold lines **13**, **15** to bring the first end panel **14** into substantially perpendicular relationship with the main panel **12** and second end panel **16** into substantially perpendicular relationship with the main panel **12**.

The blank **10** is folded about fold line **21**A to fold the first corner panel **22**A about an adjacent corner of the main panel **12**. The blank **10** is folded about fold line **21**B to fold the second corner panel **22**B about an adjacent corner of the main panel **12**. The blank **10** is folded about fold line **22**B to fold the third corner panel **24**A about an adjacent corner of the main panel **12**. The blank **10** is folded about fold line **24**B to fold the fourth corner panel **24**B about an adjacent corner of the main panel **12**.

The first securing panel **26**A is folded with respect to the first corner panel **22**A about fold line **27**A, the first securing panel **26**A is folded so as to be substantially perpendicular to the first end panel **14**.

The second securing panel **26**B is folded with respect to the second corner panel **22**B about fold line **27**B, the second securing panel **26**B is folded so as to be substantially perpendicular to the first end panel **14**.

The third securing panel **28**A is folded with respect to the third corner panel **24**A about fold line **29**A, the third securing panel **28**A is folded so as to be substantially perpendicular to the second end panel **16**.

The fourth securing panel **28**B is folded with respect to the fourth corner panel **24**B about fold line **29**B, the fourth securing panel **28**B is folded so as to be substantially perpendicular to the second end panel **19**.

Upper portions of the securing panels **26**A, **26**B, **28**A, **28**B may be inserted or engaged in the upper receiver openings provided by the first recesses R**1**.

The blank **10** is folded about fold line **17**B to bring the first inner side panel **18**B into face to face relationship with the first outer side panel **18**A. In doing so the first and third securing panels **26**A, **28**A are disposed or sandwiched between the first inner and first outer side panels **18**B, **18**A.

The blank **10** is folded about fold line **19**B to bring the second inner side panel **20**B into face to face relationship with the second outer side panel **20**A. The second and fourth securing panels **26**B, **28**B are disposed or sandwiched between the second inner and second outer side panels **20**B, **20**A.

Lower portions of the securing panels **26**A, **26**B, **28**A, **28**B are received in the lower receiver openings provided by the cutaways **30**A, **30**B, **30**C, **30**D.

A first portion of each securing panel **26**A, **26**B, **28**A, **28**B passes through a respective one of the lower receiver openings. A second portion of each securing panel **26**A, **26**B, **28**A, **28**B passes through a respective one of the upper receiver openings. In this way the first end strap **26**A/**22**A/**14**/**22**B/**26**B and the second end strap **28**A/**24**A/**16**/**24**B/**28**B are locked in position. Advantageously, the carrier **90** may be assembled or constructed without use of glue or adhesive to secure the panels **12**, **14**, **16**, **18**A, **18**A, **20**A, **20**B in an erected condition.

The assembled or preformed carrier **90** is then applied to a group of articles B. The carrier **90** is lowered with respect to a group of articles B. Each of the article retention structures RT**1**, RT**2** of the blank **10** is aligned with a respective article B in the group. Portions of the articles B pass through the main panel **12**. The toothed regions of the main panel **12** about each of the article retention structures RT**1**, RT**2** may be folded out of the plane of the main panel **12**.

Each toothed region of the main panel **12** may be folded about one of the articles B received in the respective one of the article retention structures RT**1**, RT**2**. Themain panel **12** may deform about the article B for example but not limited to a shoulder portion of the article B, where the article B is a can the shoulder portion may be provide by the neck-in, as shown in FIG. **3**.

The engaging edges of the teeth **40** engage beneath a projection. The projection may be located about the neck or chime of the article B (which may provide a flange) of an article B. When the article B is a can the projection may be provided by a canner's end seam. In other embodiments it may be provided by a ridge or undercut shaping of the article B or by an end closure of the article B for example but not limited to a crown cork or closure. In this way, the engaging edges grip or hold the article B and prevent or inhibit the article B from unintentionally separating from the main panel **12**. A package comprising the article carrier **90** and the group of article B is shown in **90** is shown in FIGS. **3** and **4**.

The carrier **90** may beneficially conceal a part of the articles B from view. The side panels **18**A, **18**A, **20**A, **20**B and/or end panels **14**, **16** may conceal a region of the articles B, for example the said panels **18**A, **18**A, **20**A, **20**B, **14**, **16** may conceal a barcode or other indicia such as but not limited to price indicia provided on individual articles B.

The side panels **18**A, **18**A, **20**A, **20**B and end panels **14**, **16** encircle or surround the group of articles B and may contain or confine the articles B; they may prevent or inhibit movement of the articles B for example tilting or splaying of the articles B when the article carrier **90** is carried by a user. The engagement of the side panels **18**A, **18**A, **20**A, **20**B with the end panels **14**, **16** via the securing panels **26**A, **26**B, **28**A, **28**B (and the corner panels **22**A, **22**B, **24**A, **24**B when present) may increase the strength, rigidity and robustness of the carrier **90** for example when carrying the carrier **90** by engagement with one of the plurality of panels **12**, **14**, **16**, **18**A, **18**A, **20**A, **20**B.

Referring now to FIG. **5** there is shown an alternative embodiment of the present disclosure. In the second illustrated embodiment, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix "100" to indicate that these features belong to the second embodiment. The alternative embodiment shares many common features with the embodiment of FIGS. **1** to **4**, therefore only the differences from the embodiment illustrated in FIGS. **1** to **4** will be described in any greater detail.

FIG. **5** shows a blank **110** comprising a plurality of panels **112**, **114**A, **114**B, **116**A, **116**B, **118**, **120**, including a main panel **112** for forming a top wall or engaging panel of a carrier **190** (see FIG. **6**).

A first side panel **118** is hingedly connected to a first side of the main panel **112** by a hinged connection in the form of a fold line **117**.

A second side panel **120** is hingedly connected to a second side of the main panel **112** by a hinged connection in the form of a fold line **119**.

The blank **110** comprises a first end structure. The first end structure comprises a first upper end panel **114**A hingedly connected to a first end of the main panel **112** by a hinged connection in the form of a fold line **113**A. A first lower end panel **114**B is hingedly connected to the first upper end panel **114**A by a hinged connection in the form of a fold line **113**B.

The first end structure comprises a first corner panel **160**A hingedly connected to a first end of the first side panel **118** by a hinged connection in the form of a fold line **161**A. A second corner panel **160**B is hingedly connected to a first end of the second side panel **120** by a hinged connection in the form of a fold line **161**B.

The first end structure comprises a first securing panel **164**A hingedly connected to the first corner panel **160**A by a hinged connection in the form of a fold line **163**A. A second securing panel **164**B is hingedly connected to the second corner panel **160**B by a hinged connection in the form of a fold line **163**B.

A first web panel **168**A is hingedly connected at one end to the first securing panel **164**A by a hinged connection in the form of a fold line **169**A and is hingedly connected at a second end to the first upper end panel **114**A by a hinged connection in the form of a fold line **171**A.

A second web panel **168**B is hingedly connected at one end to the second securing panel **164**B by a hinged connection in the form of a fold line **169**B and is hingedly connected at a second end to the first upper end panel **114**A by a hinged connection in the form of a fold line **171**B.

The blank **110** comprises a second end structure. The second end structure comprises a second upper end panel **116**A hingedly connected to a second end of the main panel **112** by a hinged connection in the form of a fold line **115**A. A second lower end panel **116**B is hingedly connected to the second upper end panel **116**A by a hinged connection in the form of a fold line **115**B.

The second end structure comprises a third corner panel **162**A hingedly connected to a second end of the first side panel **118** by a hinged connection in the form of a fold line **165**A. A fourth corner panel **162**B is hingedly connected to a second end of the second side panel **120** by a hinged connection in the form of a fold line **165**B.

The first end structure comprises a third securing panel **166**A hingedly connected to the third corner panel **162**A by a hinged connection in the form of a fold line **167**A. A fourth securing panel **166**B is hingedly connected to the fourth corner panel **162**B by a hinged connection in the form of a fold line **167**B.

A third web panel **170**A is hingedly connected at one end to the third securing panel **166**A by a hinged connection in the form of a fold line **173**A and is hingedly connected at a second end to the second upper end panel **116**A by a hinged connection in the form of a fold line **175**A.

A fourth web panel **170**B is hingedly connected at one end to the fourth securing panel **166**B by a hinged connection in the form of a fold line **173**B and is hingedly connected at a second end to the second upper end panel **116**A by a hinged connection in the form of a fold line **175**B.

It will be appreciated that the first side panel **118**, the first corner panel **160**A, the first securing panel **164**A, the third corner panel **162**A, and the third securing panel **166**A form a first strap **164**A/**160**A/**118**/**162**A/**166**A along a first side of the main panel **112**. The second side panel **120**, the second corner panel **160**B, the second securing panel **164**B, the fourth corner panel **162**B, and the fourth securing panel **166**B form a second strap **164**B/**160**B/**120**/**162**B/**166**B along a second side of the main panel **112**.

The blank **110** comprises first flap **172** hingedly connected to the first lower end panel **1148** by a hinged connection. The hinged connection is defined, at least in part, by a cut line V**1**. Cut line V**1** defines a tab P**1** extending from an outer or lower edge of the first lower end panel **114**B. The cut line V**1** forms a receiver, in the form of an opening, slot or slit, for receiving a locking tab or detent C**1**. Each of the first and second securing panels **164**A, **164**B comprises a locking tab or detent C**1** extending from a lower edge thereof.

The first flap **172** may comprise a pair of wing portions **174**A, **174**B hingedly connected by a respective fold line **177**A, **177**B to a central portion of the first flap **172**. The fold lines **177**A, **177**B may be divergently arranged with respect to each other, the fold lines **177**A, **1778** diverge towards the first lower end panel **1148**.

Each of the first and second securing panels **164**A, **1648** comprises a cutaway in the form of an aperture A**5**. Each aperture A**5** forms a second receiver for receiving a respective second locking tab or detent C**2**. The first upper end panel **114**A comprises a pair of cut lines **101**, each of which is substantially "U" shaped, each cut line **101** defines a respective detent C**2**.

The blank **110** comprises second flap **176** hingedly connected to the second lower end panel **1168** by a hinged connection. The hinged connection is defined, at least in part, by a cut line V**2**. Cut line V**2** defines a second tab P**2** extending from an outer or lower edge of the second lower end panel **116**B. The cut line V**2** forms a receiver, in the form of an opening, slot or slit, for receiving a locking tab or detent C**2**. Each of the third and fourth securing panels **166**A, **166**B comprises a locking tab or detent C**2** extending from a lower edge thereof.

The second flap **176** may comprise a pair of wing portions **178**A, **178**B hingedly connected by a respective fold line **178**A, **178**B to a central portion of the second flap **176**. The fold lines **179**A, **179**B may be divergently arranged with respect to each other, the fold lines **179**A, **179**B diverge towards the second lower end panel **1168**.

Each of the third and fourth securing panels **166**A, **166**B comprises a cutaway in the form of an aperture A**5**. Each aperture A**5** forms a second receiver for receiving a respective second locking tab or detent C**2**. The second upper end panel **116**A comprises a pair of cut lines **101**, each of which is substantially "U" shaped, each cut line **101** defines a respective detent C**2**.

The main panel **112** comprises a plurality of article retention structures RT, specifically eight article retention structures RT arranged in 2×4 matrix or array. Each of the article retention structures RT comprise an opening or aperture A**4**.

The article retention structures RT each comprise a plurality of teeth or tabs **140** disposed about the aperture A**4**.

The plurality of teeth **140** are provided by the main panel **112**. Each of the teeth **140** is hingedly connected to the main panel **112**, by a hinged connection. The hinged connection may be defined by a plurality of cut lines **141**. The plurality of cut lines **141** may be arranged as an annular series of cuts about the apertures A**4**.

The plurality of cut lines **141** may define or approximate a portion of circle.

Each of the plurality of teeth **140** comprises an engaging edge opposing a hinged edge. The engaging edges are defined by a linear portion of a cut line defining the aperture A**4**. Each engaging edge may define a part of a polygon. The illustrated embodiment comprises sixteen teeth **140** together defining a hexadecagon. Each tooth **140** comprises a pair of side edges, the side edges are defined by cut lines **143**, **145** extending radially outward from respective vertices of the hexadecagon, that is to say, from a respective vertex between a pair of adjacent linear portions of the cut line defining the portion of a hexadecagon. The cut lines **143**, **145** are divergently arranged with respect to each other and define an angle therebetween, the angle may be about 22.5°. Each of the plurality of cut lines **141** may be linear in shape.

The end structures are folded to secure the first and second side panels **118**, **120** about sides of a group of articles B. In contrast to the embodiment of FIG. **1** in which the blank **10** is performed before application to a group of articles B, the blank **110** can be applied to the group of articles B in a flat form and folded thereabout.

The main panel **112** is lowered with respect to a group of articles B. The first and second side panels **118**, **120** are folded about the opposing side of the group of articles B. The corner panels **160**A, **160**B, **162**A, **162**B are folded about the corners of the group of articles B and the securing panels **164**A, **164**B, **166**A, **166**B are folded about ends of the group of articles B.

The first and second upper end panels **114**A, **116**A are folded downwards about a respective end of the group of articles B. The first and second lower end panels **114**B, **116**B are folded upwardly with respect to the first and second upper end panels **114**A, **116**A such that the detents C**2** can be inserted into the apertures A**5**. The first and second lower end panels **114**B, **116**B are folded downwardly to return to a substantially coplanar relationship with the respective one of the first and second upper end panels **114**A, **116**A to which they are hinged, as shown in FIG. **7** (the articles B have been omitted for illustrative purposes).

The first and second flap **172**, **176** are folded internally, the wing portion **174**A, **174**B, **176**A, **176**B are folded with respect to the central portion so as to pass the side walls of adjacently disposed articles B, as shown in FIG. **8**.

FIG. **9** illustrates an internal view of an end portion of the carton **190**, the articles B have been omitted for illustrative purposes. The cut line V**2** has formed an opening in which the locking tab C**1** of each securing panel **166**A, **166**B is received.

The wing portion **178**A, **178**B are folded into coplanar relationship with the central portion of tab **172**; in this way the tab **172** is held in position by the adjacently disposed articles (not shown).

The tab **172** is held in the folded condition by the articles B and inhibits disengagement of the locking tabs C**1** from the receiver.

The tab **172** in the folded condition is in face to face relationship with the portions of the detents C**2** received in the apertures A**5**; and may inhibit disengagement of detents C**2** from the apertures A**5**.

The tabs P**1**, P**2** may conceal or protect the locking tabs C**1** so as to improve security of the locking tabs C**1** in the receiver.

Referring now to FIG. **10** there is shown an alternative embodiment of the present disclosure. In the third illustrated embodiment, like numerals have, where possible, been used to denote like parts, albeit with the addition of the prefix "200" to indicate that these features belong to the second embodiment. The alternative embodiment shares many common features with the embodiment of FIGS. **1** to **9**, therefore only the differences from the embodiment illustrated in FIGS. **1** to **9** will be described in any greater detail.

FIG. **10** shows a blank **210** comprising a plurality of panels **212**, **214**A, **214**B, **216**A, **216**B, **218**, **220**, including a main panel **212** for forming a top wall or engaging panel of a carrier (not shown).

The main panel **212** comprises at least one article retention structure RT**1**, RT**2**. The main panel **212** comprises a plurality of article retention structures RT**1**, RT**2**, specifically eight article retention structures RT**1**, RT**2** arranged in 2×4 matrix or array. Each of the article retention structures RT**1**, RT**2** comprises an opening or aperture A**7**, A**8**.

The article retention structures RT**1**, RT**2** of the illustrated embodiment take the form of a plurality of teeth or tabs **246**,

244 arranged in an annular series about an aperture A7, A8 to form part of an article receiving opening.

The blank 210 comprises four first or endmost article retention structures RT1 each comprising a first opening or aperture A7. The blank 210 comprises four second, medial or intermediate article retention structures RT2 each comprising a second opening or aperture A8.

The endmost article retention structures RT1 comprises an article receiving opening defined in part by the first aperture A7 which is defined in, or struck from, the main panel 212.

The intermediate article retention structures RT2 comprises an article receiving opening defined in part by the second aperture A8 which is defined in, or struck from, the main panel 212.

The endmost article retention structures RT1 and the intermediate article retention structures RT2 each comprise a plurality of teeth or tabs 246, 244 disposed about the first or second aperture A7, A8 respectively.

The plurality of teeth 246, 244 are provided by the main panel 212. Each of the teeth 246, 244 is hingedly connected to the main panel 212, by a hinged connection. The hinged connection may be defined by a plurality of cut lines 41. The plurality of cut lines 242, 254 may be arranged as an annular series of cuts about the first or second apertures A1, A2. The plurality of cut lines 242, 254 may define or approximate a portion of circle.

Each of the first article retention structures RT1 is substantially similar in construction and will therefore be described in detail with reference to a first one of the first article retention structures RT1 located adjacent to a first end of the blank 210 as shown in FIG. 10.

The first article retention structure RT1 comprises a plurality of first or full teeth 246 disposed about the aperture A1. Each of the plurality of first teeth 246 comprises an engaging edge E1 opposing a hinged edge. The engaging edges E1 are defined by a linear portion of a cut line defining the aperture A7. Each engaging edge E1 defines a part of a hexadecagon. The illustrated embodiment comprises eight first teeth 246 together defining a portion of a hexadecagon. Each tooth 246 comprises a pair of side edges, the side edges are defined by cut lines 247, 248 extending radially outward from respective vertices of the hexadecagon. That is to say from a respective vertex between a pair of adjacent linear portions of the cut line defining the aperture A7. The cut lines 247, 248 are divergently arranged with respect to each other and define an angle therebetween, the angle may be about 22.5°.

The first article retention structure RT1 comprises a plurality of first circumferential cut lines 254. Each of the plurality of first circumferential cut lines 254 is aligned with one of the radial cut lines 247, 248 such that said one of the radial cut lines 247, 248 or a notional extension thereof bisects a respective one of the plurality of first circumferential cut lines 254.

Each of the plurality of first circumferential cut lines 254 is spaced apart from said one of the radial cut lines 247, 248 bisecting it so as to define a connecting nick or bridge portion between a pair of adjacently disposed teeth 246, 244.

Each of the plurality of first circumferential cut lines 254 may be linear in shape.

The first article retention structure RT1 comprises a plurality of second circumferential cut lines 242. Each of the plurality of second circumferential cut lines 242 is disposed between a pair of the plurality of first circumferential cut lines 254 and is spaced apart therefrom so as to define a pair of connecting nick or bridge portions between each tooth 246, 244 and the main panel 212. The pair of connecting nick or bridge portions provide a hinged or foldable connection between each tooth 246, 244 and the main panel 212.

Each of the plurality of second circumferential cut lines 142 may be linear in shape.

In alternative embodiments each of the plurality of first circumferential cut lines 254 may be arcuate or curved. The first circumferential cut lines 254 may comprise a radius of curvature which is equal to half the diameter of the article receiving openings. The first circumferential cut lines 254 may comprise a radius of curvature which is greater than half the diameter of the apertures A7.

In alternative embodiments each of the plurality of second circumferential cut lines 242 may be arcuate or curved. The second circumferential cut lines 242 may comprise a radius of curvature which is equal to half the diameter of the article receiving openings. The second circumferential cut lines 242 may comprise a radius of curvature which is greater than half the diameter of the aperture A7.

The first and second circumferential cut lines 242, 254 when linear may be considered to define portions of a circle of infinite radius.

In the illustrated embodiment, the radius of curvature of each of the plurality of second circumferential cut lines 242 is equal to the radius of curvature of each of the plurality of first circumferential cut lines 254 however in other embodiments it may be different.

Optionally, the plurality of teeth 246, 244 is interrupted by a first recess or cutaway 256B. The first recess 256B lies upon a first notional line y-y. First notional line y-y extends radially from the centre C of the apertures A7, A8 and passes through the centre of the first recess 256B. The first notional line y-y may extend across the grain of the blank 210. The first notional line y-y is oriented perpendicularly with respect to the grain direction. The first notional line y-y extends longitudinally of the blank 210.

Optionally, the plurality of teeth 246, 244 is interrupted by a second recess or cutaway 256C. The second recess 256C lies upon a second notional line x-x. Second notional line x-x extends radially from the centre C of the apertures A7, A8 and passes through the centre of the second recess 256C. The second notional line x-x may extend along the grain of the blank 210. The notional line x-x is oriented parallel with respect to the grain direction. The notional line x-x extends transversely, or laterally, of the blank 210.

The first recess 256B is dimensioned so as to occupy a first arc defined by a first minor sector. The first minor sector is defined in part by a first sector notional line extending radially from the centre C of the notional circle and passing through a side edge of a first partial tooth 244 disposed adjacent a first side of the first recess 256B and in part by a second sector notional line extending radially from the centre C of the notional circle and passing through a side edge of a second partial tooth 244 disposed adjacent a second, opposing, side of the first recess 256B. The first and second sector notional lines define a second angle therebetween. The second angle may be in the range 35° to 50°, and may be around 45°.

The second recess 256C is dimensioned so as to occupy a second arc defined by a second minor sector. The second minor sector is defined in part by a third sector notional line extending radially from the centre C of the notional circle and passing through a side edge of a third partial tooth 244 disposed adjacent a first side of the second recess 256C and in part by a fourth sector notional line extending radially from the centre C of the notional circle and passing through a side edge of a fourth partial tooth 144 disposed adjacent a second, opposing, side of the second recess 256C. The third

and fourth sector notional lines define a third angle therebetween. The third angle may be in the range 35° to 50°, and may be around 45°.

The first and third sector notional lines define a major or first toothed sector, the first toothed sector defines a third arc; the third arc is occupied by teeth **246**, **244**. That is to say teeth **246**, **244** are disposed about the third arc, in a perimeter region of the first aperture A**7**.

The second and fourth sector notional lines define a third minor sector or second toothed sector, the second toothed sector defines a fourth arc; the fourth arc is occupied by teeth **246**, **244**. That is to say teeth **246**, **244** are disposed about the fourth arc, in a perimeter region of the first aperture A**7**.

The first article retention structure RT**1** comprises a first engaging tab T**1** opposing the second recess **256**C and a second engaging tab T**2** opposing the first recess **256**B.

The first engaging tab T**1** is disposed proximate the first or second side panel **218**, **220**. The second engaging tab T**2** is disposed proximate the first or second upper end panel **214**A, **216**A. The first engaging tab T**1** is integral with the main panel **212**, that is to say the first and second circumferential cut lines **242**, **254** have been omitted. The first engaging tab T**1** is proximate to the fold line **217**, **219** hinging the main panel to the respective side panel **218**, **220**.

The second engaging tab T**2** is integral with the main panel **212**, that is to say the first and second circumferential cut lines **242**, **254** have been omitted. The second engaging tab T**2** is proximate to the fold line **213**A, **215**A hinging the main panel to the respective upper end panel **214**A, **216**A.

Each of the second article retention structures RT**2** is substantially similar in construction and will therefore be described in detail with reference to a first one of the second article retention structures RT**2** located adjacent to the first one of the first article retention structures RT**1** as shown in FIG. **10**.

The second article retention structure RT**2** comprises an article receiving opening defined in part by a second aperture A**8**.

The second article retention structure RT**2** comprises a plurality of teeth **246**, **244** disposed about the second aperture A**8**. The plurality of teeth **246**, **244**, or at least free edges thereof, may define or approximate a second notional circle.

The plurality of teeth **246**, **244** are hinged to the main panel **212** by a fold line. The fold line may be defined by a plurality of cut lines **242**, **254**. The plurality of cut lines **242**, **254** may define or approximate a circle.

The second aperture A**8** comprises a plurality of first or full teeth **246** disposed about the second aperture A**8**. Each of the plurality of first teeth **246** comprises an engaging edge E**1** opposing a hinged edge. The engaging edges E**1** are defined by a linear portion of a cut line defining the second aperture A**8**. Each engaging edge E**1** defines a part or side of a hexadecagon. The illustrated embodiment comprises seven first teeth **246** together defining a portion of a hexadecagon. Each tooth **246** comprises a pair of side edges, the side edges are defined by cut lines **247**, **248** extending radially outward from respective vertices of the hexadecagon. That is to say from a respective vertex between a pair of adjacent linear portions of the cut line defining the second aperture A**8**. The cut lines **247**, **248** are divergently arranged with respect to each other and define an angle therebetween, the angle may be about 22.5°.

The second article retention structure RT**2** comprises a plurality of first circumferential cut lines **254**. Each of the plurality of first circumferential cut lines **254** is aligned with one of the radial cut lines **247**, **248** such that said one of the radial cut lines **247**, **248**, or a notional extension thereof, bisects a respective one of the plurality of first circumferential cut lines **254**.

Each of the plurality of first circumferential cut lines **254** is spaced apart from said one of the radial cut lines **247**, **248** bisecting it so as to define a connecting nick or bridge portion between a pair of adjacently disposed teeth **246**, **244**. The connecting nick or bridge portion is disposed proximate a base of the teeth **246**.

Each of the plurality of first circumferential cut lines **254** may be linear in shape.

The second article retention structure RT**2** comprises a plurality of second circumferential cut lines **242**. Each of the plurality of second circumferential cut lines **242** is disposed between a pair of the plurality of first circumferential cut lines **254** and is spaced apart therefrom so as to define a pair of connecting nick or bridge portions between each tooth **246**, **244** and the main panel **212**. The pair of connecting nick or bridge portions provide a hinged or foldable connection between each tooth **246**, **244** and the main panel **212**.

Each of the plurality of second circumferential cut lines **242** may be linear in shape.

The plurality of teeth **246**, **244** is interrupted by a first recess or cutaway **256**B, by a second recess or cutaway **256**C and by a third recess or cutaway **256**A. The first and third recesses **256**B, **256**A each lie upon the first notional line y-y. The first notional line y-y extends radially from the centre C of the second aperture A**8** and passes through the centre of each of the first and third recesses **256**B, **256**A.

The first recess **256**B is dimensioned so as to occupy a first arc defined by a first minor sector. The first minor sector is defined in part by a first sector notional line extending radially from the centre C of the notional circle and passing through a side edge of a first partial tooth **244**, disposed adjacent to a first side of the first recess **256**B, and in part by a second sector notional line extending radially from the centre of the notional circle and passing through a side edge of a second partial tooth **244**, disposed adjacent to a second, opposing, side of the first recess **256**B. The first and second sector notional lines define an angle therebetween. The angle may be in the range 35° to 50°, and may be around 45°.

The second recess **256**C is dimensioned so as to occupy a second arc defined by a second minor sector. The second minor sector is defined in part by a third sector notional line extending radially from the centre C of the notional circle and passing through a side edge of a third partial tooth **244**, disposed adjacent to a first side of the second recess **256**C, and in part by a fourth sector notional line extending radially from the centre C of the notional circle and passing through a side edge of a fourth partial tooth **244**, disposed adjacent to a second, opposing, side of the second recess **256**C. The third and fourth sector notional lines define an angle therebetween. The third angle may be in the range 35° to 50°, and may be around 45°.

The third recess **256**A is dimensioned so as to occupy a third arc defined by a third minor sector. The third minor sector is defined in part by a fifth sector notional line extending radially from the centre C of the notional circle and passing through a side edge of a fifth partial tooth **244**, disposed adjacent to a first side of the third recess **256**A, and in part by a sixth sector notional line extending radially from the centre C of the notional circle and passing through a side edge of a sixth partial tooth **144**, disposed adjacent to a second, opposing, side of the third recess **256**A. The fifth and sixth sector notional lines define an angle therebetween. The third angle may be in the range 35° to 50°, and may be around 45°.

The first and fifth sector notional lines define a major or first toothed sector, the first toothed sector defines a fourth arc; the fourth arc is occupied by teeth **246**, **244**. That is to say teeth **246**, **244** are disposed about the fourth arc, in a perimeter region of the second aperture A**8**.

The second and fourth sector notional lines define a third minor sector or second toothed sector, the second toothed sector defines a fifth arc; the fifth arc is occupied by teeth **246**, **244**. That is to say teeth **246**, **244** are disposed about the fifth arc, in a perimeter region of the second aperture A**8**.

The third and sixth sector notional lines define a fourth minor sector or third toothed sector, the third toothed sector defines a sixth arc; the sixth arc is occupied by teeth **246**, **244**. That is to say teeth **246**, **244** are disposed about the sixth arc, in a perimeter region of the second aperture A**8**.

The first and third recesses **256**B, **256**A are diametrically opposed to each other.

The second recess **256**C is oriented or disposed substantially orthogonally to the first and third recesses **256**B, **256**A.

The centre of the first and third recesses **256**B, **256**A of the second article retention structure RT**2** are collinear with the centre of the first recess **256**B of the first article retention structure RT**1**.

The first recess **256**B of the second article retention structure RT**2** is disposed proximate to the first recess **256**B of the first article retention structure RT**1** and is oriented in opposition thereto.

Each of the second recesses **256**C of the second article retention structures RT**2** is disposed proximate to a second recess of an adjacently disposed second article retention structures RT**2**, and is oriented in opposition thereto.

Each of the second recesses **256**C of the first article retention structures RT**1** is disposed proximate to a second recess **256**C of an adjacently disposed first article retention structures RT**1**, and is oriented in opposition thereto.

The second article retention structure RT**2** comprises a first engaging tab T**1** opposing the second recess **256**C.

The first engaging tab T**1** is disposed proximate the first or second side panel **218**, **220**. The first engaging tab T**1** is integral with the main panel **212**, that is to say the first and second circumferential cut lines **242**, **254** have been omitted. The first engaging tab T**1** is proximate to the fold line **217**, **219** hinging the main panel to the respective side panel **218**, **220**.

The grain of the material forming the blank **210** may be arranged to be tangential to the centre of the first and third recesses **256**B, **256**A of the second article retention structure RT**2**. The grain of the material forming the blank **210** may be arranged to be tangential to the centre of the first recess **256**B of the first article retention structure RT**1**. In this way in order for a tear to propagate between the first aperture A**7** and the second aperture A**8** the tear must propagate across the grain of the blank **210**. In this way the blank **210** is arranged to provide maximum resistance to tear propagation between the first and second apertures A**7**, A**8**.

Removal of the teeth **246**, by providing recesses **256**B, **256**C, **256**A at locations where two adjacent apertures A**7**, A**8** are disposed in close proximity, for example when packaging articles B of the sleek or slim design (articles B which are substantially of the same diameter over their entire height. In some embodiments the variation in diameter between a top closure of the article Band the main body of the article B may be less than 7 mm, may be less than 5 mm and optionally is less than 4 mm.), has been found to reduce the likelihood of tear propagation. This beneficial advantage may be a result of removal of the radial cut lines **247**, **248** in regions of the blank **210** where the apertures A**7**, A**8** are in close proximity.

The blanks **10**; **110**; **210** include at least a paperboard substrate. The material of the paperboard substrate may be selected from any conventional paperboard, for example, ranging in weight upwardly from about 10pt., preferably from about 16pt. to about 28pt. (**0.028**"1~0.7 mm). An example of such a substrate is a 27 point (pt.) SBS board (solid bleached sulfate paperboard coated on one side, trade name PrintKote®) or CNK® board (Coated Natural Kraft®—an unbleached kraft paperboard having a clay coating on one side, trade name CarrierKote™) manufactured by WestRock® Company. The paperboard substrate may be a bleached or unbleached board. The board may be coated on at least one side, optionally the side opposite the lamination, with a conventional coating selected for compatibility with the printing method and board composition.

The blanks **10**; **110**; **210** may include a tear resistant layer laminated to the paperboard layer. It optionally includes an adhesive layer between the paperboard substrate and the tear resistant layer. The tear resistant layer may be disposed over the uncoated side of the paperboard substrate and may be formed of polymeric material and secured to the substrate. The tear resistant layer imparts toughness to the laminate structure. Suitable tear resistant materials may include, but not be limited to, tear resistant laminated sheet material, e.g., NATRALOCK®, which may include a layer of an n-axially oriented film, e.g. MYLAR®, which is a bi-axially oriented polyester, oriented nylon, cross-laminated polyolefin or high density polyolefin. The orientation and cross-laminated structure of these materials contribute to the tear resistant characteristic. Also, tear resistance may be attributed to the chemical nature of the tear resistant material such as extruded metallocene-catalyzed polyethylene (mPE).

Alternatively, the tear resistant layer may be a layer of linear low-density polyethylene (LLDPE). In embodiments where linear low-density polyethylene (LLDPE) or mPE is used, it is not necessary to incorporate an adhesive layer. Other suitable materials having a high level of tear resistance may also be used.

The adhesive layer may be formed of polyolefin material such as a low-density polyethylene (LDPE). The adhesive layer may be placed between the substrate and the tear resistant layer to secure the tear resistant layer to the substrate.

The present disclosure provides a carrier of the top engaging type having improved article retention structures or article top engaging devices.

An article carrier **90**; **190** for clipping or engaging on at least one article B. The article carrier **90**; **190** comprises an engaging panel **12**; **112**; **212** which has at least one article-engaging structure RT; RT**1**, RT**2** for engaging a part of the at least one article B. The article carrier **90**; **190** comprises a bundling, grouping or support structure for encircling the at least one article B. The bundling structure comprises a first segment and a second segment. In some embodiments the article carrier **90**; **190** may be a preformed article carrier **90** assembled or constructed prior to application to a group of articles B.

The first segment includes a first panel **14**; **118**; **218** hingedly connected to the engaging panel **12**; **112**; **212** and a bridging portion **22**A, **26**A; **160**A; **164**A; **260**A; **264**A hingedly connected to the first panel **14**; **118**; **218**.

The second segment includes a second panel **18**A; **114**A/**114**B; **214**A/**214**B hingedly connected to the engaging panel **12**, **12**; **112**; **212** a third panel **18**B; **172**; **272** hingedly

connected to the second panel **18**A; **114**A/**114**B; **214**A/**214**B and disposed in an overlapping position with the second panel **18**A; **114**A/**114**B; **214**A/**214**B and a bridge-engaging feature in engagement with the bridging portion **22**A, **26**A; **160**A; **164**A; **260**A; **264**A of the first segment.

The bridging portion **22**A, **26**A; **160**A; **164**A; **260**A; **264**A may comprise a catch or detent for arresting or inhibiting relative movement between the bridging portion **22**A, **26**A; **160**A; **164**A; **260**A; **264**A and the second and third panels **18**A, **18**B; **114**A/**114**B, **172**; **214**A/**214**B, **272**.

The bridge-engaging feature is provided at least by the second and third panels **18**A, **18**B; **114**A/**114**B, **172**; **214**A/**214**B, **272** such that at least part of the bridging portion **22**A, **26**A; **160**A; **164**A; **260**A; **264**A is disposed between the second and third panels **18**A, **18**B; **114**A/**114**B, **172**; **214**A/**214**B, **272** in face-contacting arrangement with the second and third panels **18**A, **18**B; **114**A/**114**B, **172**; **214**A/**214**B, **272**. The bridge-engaging feature may comprise a first cutaway defined in at least one of the second and third panels **18**A, **18**B; **114**A/**114**B, **172**; **214**A/**214**B, **272** the first cut-away providing a first receiver for a first portion of the bridging portion **22**A, **26**A; **160**A; **164**A; **260**A; **264**A.

The bridge-engaging feature may further comprise a second cutaway in at least one of the engaging panel **12** and second panel **18**A, the second cutaway providing a second receiver for a second portion of the bridging portion **22**A, **26**A. The second cutaway may extend from or interrupt at least one article-engaging structure RT**1**, RT**2**.

The bridge-engaging feature may further comprise a second cutaway in one of the bridging portion **160**A; **164**A; **260**A; **264**A and second panel **114**A/**114**B; **214**A/**214**B, the second cutaway providing a second receiver for a tab C**1** provided by the other one of the bridging portion **160**A; **164**A; **260**A; **264**A and second panel **114**A/**114**B; **214**A/**214**B.

The present disclosure also provides an article carrier **90** comprising an engaging panel **12** which has at least one article-engaging structure RT**1**, RT**2** for engaging a part of the at least one article B and a bundling structure for encircling the at least one article B. The bundling structure comprises a first segment, a second segment, and a bridge-engaging feature. The first segment includes a first panel **14**, **16** hingedly connected to the engaging panel **12** and a bridging portion **22**A/**26**A, **22**B/**26**B, **24**A/**28**A, **24**B/**28**B hingedly connected to the first panel **14**, **16**. The second segment includes a second panel **18**A hingedly connected to the engaging panel **12**. The bridge-engaging feature is provided by at least part R**1** of the at least one article-engaging structure RT**1**. The bridge-engaging feature is engageable, or in engagement, with the bridging portion **22**A/**26**A, **22**B/**26**B, **24**A/**28**A, **24**B/**28**B of the first segment such that the first panel **14**, **16** and second panel **18**A are interconnected continuously by the bridging portion **22**A/**26**A, **22**B/**26**B, **24**A/**28**A, **24**B/**28**B extending between the first and second segments.

The bridge-engaging feature may comprise at least one locking element provided by the second panel and at least one locking opening defined in the bridging portion and receiving the locking element.

A fugitive glue may be employed to secure the end, side or corner panels to the articles B. Use of a fugitive glue is optional, an advantage of a fugitive glue is its tendency to remain attached to the carrier when the articles are disengaged from the carrier (this may be more desirable than having the glue remain attached to the articles). In alternative embodiments other adhesives maybe employed such as, but not limited to, hot-melt glue. The end panels **14**, **16** may be adhered to at least one article B. The inner side panels **18**B, **20**B may be adhered to at least one article B.

The carrier may comprise a handle opening defined, at least in part, in one of the panels forming the first or second segment. The handle opening may be defined in part in the engaging panel.

The carrier may comprise a handle opening defined, at least in part, in the engaging panel.

The carrier **90** may comprise a side panel **18**A/**18**B, **20**A/**20**B of a two-ply structure comprising an inner side panel **18**B, **20**B and an outer side panel **18**A, **20**A in face to face relationship therewith. The inner side panel **18**B, **20**B may be hingedly connected to the outer side panel **18**A, **20**A.

It will be recognized that as used herein, directional references such as "top", "bottom", "base", "front", "back", "end", "side", "inner", "outer", "upper" and "lower" do not necessarily limit the respective panels to such orientation, but may merely serve to distinguish these panels from one another.

As used herein, the terms "hinged connection" and "fold line" refer to all manner of lines that define hinge features of the blank, facilitate folding portions of the blank with respect to one another, or otherwise indicate optimal panel folding locations for the blank. Any reference to "hinged connection" should not be construed as necessarily referring to a single fold line only; indeed a hinged connection can be formed from two or more fold lines wherein each of the two or more fold lines may be either straight/linear or curved/curvilinear in shape. When linear fold lines form a hinged connection, they may be disposed parallel with each other or be slightly angled with respect to each other. When curvilinear fold lines form a hinged connection, they may intersect each other to define a shaped panel within the area surrounded by the curvilinear fold lines. A typical example of such a hinged connection may comprise a pair of arched or arcuate fold lines intersecting at two points such that they define an elliptical panel therebetween. A hinged connection may be formed from one or more linear fold lines and one or more curvilinear fold lines. A typical example of such a hinged connection may comprise a combination of a linear fold line and an arched or arcuate fold line which intersect at two points such that they define a half moon-shaped panel therebetween.

As used herein, the term "fold line" may refer to one of the following: a scored line, an embossed line, a debossed line, a line of perforations, a line of short slits, a line of half-cuts, a single half-cut, an interrupted cutline, a line of aligned slits, a line of scores and any combination of the aforesaid options.

It should be understood that hinged connections and fold lines can each include elements that are formed in the substrate of the blank including perforations, a line of perforations, a line of short slits, a line of half-cuts, a single half-cut, a cutline, an interrupted cutline, slits, scores, embossed lines, debossed lines, any combination thereof, and the like. The elements can be dimensioned and arranged to provide the desired functionality. For example, a line of perforations can be dimensioned or designed with degrees of weakness to define a fold line and/or a severance line. The line of perforations can be designed to facilitate folding and resist breaking, to facilitate folding and facilitate breaking with more effort, or to facilitate breaking with little effort.

The phrase "in registry with" as used herein refers to the alignment of two or more elements in an erected carton, such as an aperture formed in a first of two overlapping panels and a second aperture formed in a second of two overlapping panels. Those elements in registry with each other may be

aligned with each other in the direction of the thickness of the overlapping panels. For example, when an aperture in a first panel is "in registry with" a second aperture in a second panel that is placed in an overlapping arrangement with the first panel, an edge of the aperture may extend along at least a portion of an edge of the second aperture and may be aligned, in the direction of the thickness of the first and second panels, with the second aperture.

The invention claimed is:

1. An article carrier for engaging at least one article, the article carrier comprising an engaging panel which has at least one article-engaging structure for engaging a part of the at least one article, wherein the article carrier further comprises a bundling structure for at least partially encircling the at least one article, the bundling structure comprises a first segment and a second segment, the first segment comprises:

a first panel hingedly connected to the engaging panel; and

a bridging portion hingedly connected to the first panel, wherein the second segment comprises:

a second panel hingedly connected to the engaging panel;

a third panel hingedly connected to the second panel and disposed in an at least partially overlapping position with the second panel; and

a bridge-engaging feature in engagement with the bridging portion of the first segment,

wherein the bridge-engaging feature is provided at least by one of the second and third panels such that at least part of the bridging portion is disposed between the second and third panels in face-contacting arrangement with the second and third panels.

2. An article carrier, according to claim **1**, wherein the bridge-engaging feature comprises a first cutaway defined in at least one of the second and third panels, the first cutaway providing a first receiver for a first portion of the bridging portion.

3. An article carrier, according to claim **1**, wherein the bridge-engaging feature comprises a second cutaway in at least one of the engaging panel and the second panel, the second cutaway being engageable with a second portion of the bridging portion.

4. An article carrier, according to claim **3**, wherein the second cutaway extends from one of said at least one article-engaging structures.

5. An article carrier, according to claim **1**, wherein the bridging portion comprises at least one detent or locking tab.

6. An article carrier, according to claim **1**, wherein the bridge-engaging feature comprises at least one locking element provided by the second panel and at least one locking opening defined in the bridging portion and receiving the locking element.

7. An article carrier, according to claim **1**, wherein the bridge-engaging feature comprises a second cutaway in one of the bridging portion and the second panel, the second cutaway providing a second receiver for a tab provided by the other one of the bridging portion and the second panel.

8. An article carrier, according to claim **1**, comprising a handle opening defined, at least in part, in the engaging panel.

9. An article carrier for engaging at least one article, the article carrier comprising an engaging panel which has at least one article-engaging structure for engaging a part of the at least one article and a bundling structure for at least partially encircling the at least one article, the bundling structure comprising a first segment, a second segment, and a bridge-engaging feature, wherein the first segment comprises:

a first panel hingedly connected to the engaging panel; and

a bridging portion hingedly connected to the first panel;

wherein the second segment comprises:

a second panel hingedly connected to the engaging panel;

wherein the bridge-engaging feature is provided by at least part of the at least one article-engaging structure, the bridge-engaging feature being engaged with the bridging portion of the first segment such that the first panel and the second panel are interconnected continuously by the bridging portion extending between the first panel and the second panel.

10. An article carrier, according to claim **9**, comprising a handle opening defined, at least in part, in one of the first panel and the second panel.

11. An article carrier, according to claim **10**, wherein the handle opening is defined in part in the engaging panel.

12. A blank for forming an article carrier, the blank comprising:

an engaging panel which has at least one article-engaging structure for engaging a part of at least one article to be carried by the article carrier; and

a bundling structure for at least partially encircling the at least one article, the bundling structure comprising a first segment, a second segment, and a bridge-engaging feature, wherein the first segment comprises:

a first panel hingedly connected to the engaging panel; and

a bridging portion hingedly connected to the first panel;

wherein the second segment comprises:

a second panel hingedly connected to the engaging panel;

wherein the bridge-engaging feature is provided at least in part by the second segment, the bridge-engaging feature being engageable with the bridging portion of the first segment in a setup carrier such that the first panel and second panel are interconnected continuously by the bridging portion extending between the first segment and the second segment.

13. A blank according to claim **12**, wherein the second segment further comprises:

a third panel hingedly connected to the second panel and disposed in an at least partially overlapping position with the second panel;

wherein the bridge-engaging feature is provided at least by the second and third panels and arranged such that in a setup carrier at least part of the bridging portion is disposed between the second and third panels in face-contacting arrangement with the second and third panels.

14. A blank according to claim **13**, wherein the bridge-engaging feature comprises a cutaway defined in at least one of: (i) the engaging panel and (ii) at least one of the second and third panels, the cutaway providing a receiver for a tab of the bridging portion.

15. A blank according to claim **14**, wherein each of the at least one article-engaging structure comprises an aperture formed in the engaging panel, and

wherein the cutaway extends from the aperture.

16. A blank according to claim **12**, wherein the bridging portion comprises at least one detent or locking tab configured to engage with the bridge-engaging feature.

17. A blank according to claim **12**, further comprising a handle opening defined, at least in part, in the engaging panel.

18. A blank according to claim **12**, wherein the bridge-engaging feature is provided by at least part of the at least one article-engaging structure.

19. A blank according to claim **12**, wherein the bridge-engaging feature comprises:

at least one locking element provided by the second segment; and

at least one locking opening defined in the bridging portion and configured to receive the locking element such that the second segment is held in engagement with the bridging portion in the setup carrier.

20. A blank according to claim **12**, wherein the bridge-engaging feature comprises a cutaway defined in one of the bridging portion and the second segment, the cutaway providing a receiver for a tab provided by the other one of the bridging portion and the second segment.

* * * * *